The FOUNDRY

Volume 57
Number 24

Published
Semimonthly

CLEVELAND, OHIO, DECEMBER 15, 1929

Castings Help To Beautify Building Entrances

THE origin of the marquee or canopy extends back to ancient times. In all probability it was used first in Greece or Egypt as a protection against small insects and the rays of the sun. It is recorded in some of the early writings that the canopy was used for that purpose by the Caliphs of Turkey, Pharaohs of Egypt,

A Beautiful Entrance to a Large City Office Building

emperors and kings as they marched in ceremonial processions. On the Field of the Cloth of Gold, where Henry VIII of England and Francis I of France conferred, the beauty of the canopies and other trappings was striking. With the passing of the medieval times and the downfall of the feudal system, such coverings were used less and less for the panoply of display. However, as the modern era of home and building construction got under way, the marquee came to be used extensively as a decoration and a cover for the entrances to buildings. Today many of the finest buildings are so decorated, adding grace and beauty to the entrances of public buildings, such as those devoted to theaters, offices, garages, etc., and also to private homes. The marquee gives the impression of size to the entrances they adorn. Castings are used largely in the construction of the marquee, with both ferrous and nonferrous foundries contributing castings for these entrance decorations.

Find Where Castings Can Be Sold.

CONTENTS

FEATURE ARTICLES

	Page
Steel Foundry Centralizes Operations—By Norman F. Hindle	1034
British Foundrymen Cast Variety of Alloys—Part IV—By Thomas H. Turner	1040
Zinc Chloride Fluxes Aluminum—By James Silberstein	1042
Dry Molds for Ice Machinery Castings—By Pat Dwyer	1043
Tests Refractoriness of Molding Sands—By J. F. McMahon	1052
Rigid Mold Required for Heavy Steam Table—By R. H. Palmer	1057
Making Agricultural Implements—By H. Bornstein	1059
Bill Melts a Bronze Heat in a Cupola—By Pat Dwyer	1064
To Present Series on General Foundry Practice	1069
Prospects Bright for 1930	1072

REGULAR DEPARTMENTS

Questions and Answers on Foundry Practice	1048
Problems in Nonferrous Founding — By Charles Vickers	1051
What Others Are Thinking	1067
The Shakeout	1068
Comings and Goings of Foundrymen	1069
Trade Trends in Tabloid	1073
What the Foundries Are Doing	1074
New Trade Publications	1074

—⊡—

PUBLISHED BY THE PENTON PUBLISHING CO., CLEVELAND, O.
BRANCH OFFICES

CHICAGO ..... 1347 Peoples Gas Bldg.
CINCINNATI ..... 209 Edwards Bldg.
NEW YORK ..... 2203-2206 No. 220 Broadway
PITTSBURGH ..... 2148-49 Oliver Bldg.
SAN FRANCISCO ..... 24 California Street
WASHINGTON, D. C. ..... 1653 Pennsylvania Avenue
LONDON, ENGLAND ..... 416-417 Caxton House, Westminster, S. W. 1
BIRMINGHAM, ENGLAND ..... 14 New Street
PARIS, FRANCE ..... No. 9 Rue de Londres
BERLIN, GERMANY ..... Dahlmerstrasse 64A, Berlin, Lichterfeld-West

Cable address, IROTRAPEN, London

SUBSCRIPTION

United States and Mexico ..... $3.00 a year
Canada ..... $4.00 a year
Great Britain and other Foreign Countries ..... £1:0:0 a year
Single Copies ..... 25 cents

Copies published three months or more previous to date of current issue, 50 cents each.

Member, Audit Bureau of Circulations, Associated Business Papers Inc., National Publishers' Association

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified subscribers, and honest advertising of dependable products

Copyright 1929 by the Penton Publishing Co.

Fig. 1—Tapping an Electric Furnace Heat

Fig. 2—Cleaning and Grinding Departments Are Arrang

Steel Foundry CENTRALIZES

SANDUSKY is a beautiful and progressive city located in the northern part of Ohio on the shore of Lake Erie. It is a center of industrial activity with a variety of manufacturing concerns employing a large number of men. In this location the Farrell-Cheek Steel Foundry Co., had its beginning, and incorporated in 1910. The company had been incorporated in the state of Ohio with the following officers: Herbert Farrell, president; John E. Sweet, secretary and purchasing agent; H. B. Castleman, treasurer; T. A. Martin, superintendent; Martin L. Ritter, sales manager, and F. P. Murschel, production manager. The first foundry building was 100 x 100 feet and was put in operation on Oct. 13, 1910. Since that time the company has grown and expanded gradually. The fact that its original manufacturing area covered a total of 10,000 square feet and that its present space comprises a total of 80,000 square feet gives some idea of the growth of the company.

When the plant first was placed in operation, its failure was predicted by many. Trials such as irregular labor, workmen not skilled in steel foundry practice, business depressions, etc., caused the people of the town to view the new industry with apprehension. However, the men at the head of the organization had faith in their business and that faith since has been justified.

The first jobs made by the company were small steel castings. The firm has continued to specialize in that class of work to the present time. The range of work is from a few pounds to approximately 500 pounds, but special castings are produced which weigh as much as 1000 pounds each.

The company has developed a specially alloyed steel which it manufactures and with this steel and its carbon steels specializes in castings for road machinery, construction machinery, and such equipment as shovel buckets, crawler wagons, scrapers, loaders, tractors, pavers, conveyors, etc.

The plant is located on the east side of the city and consists of an office building, main foundry building, machine shop, sidings, and storage yard for raw materials and flasks. A

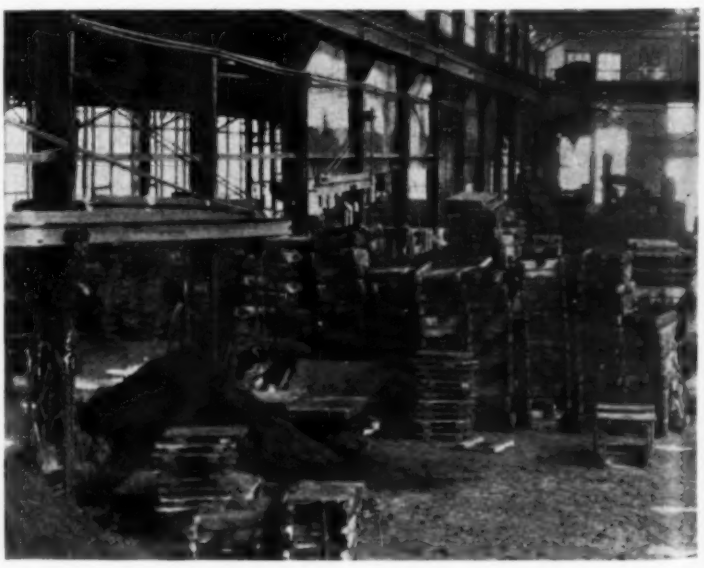


Fig. 4—View of the Foundry with the Molding

ed Compactly Which Tends To Reduce the Production Costs

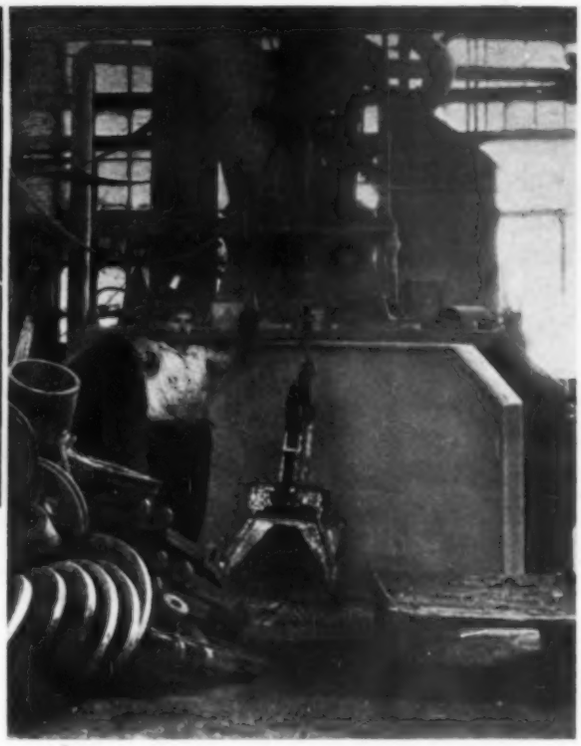


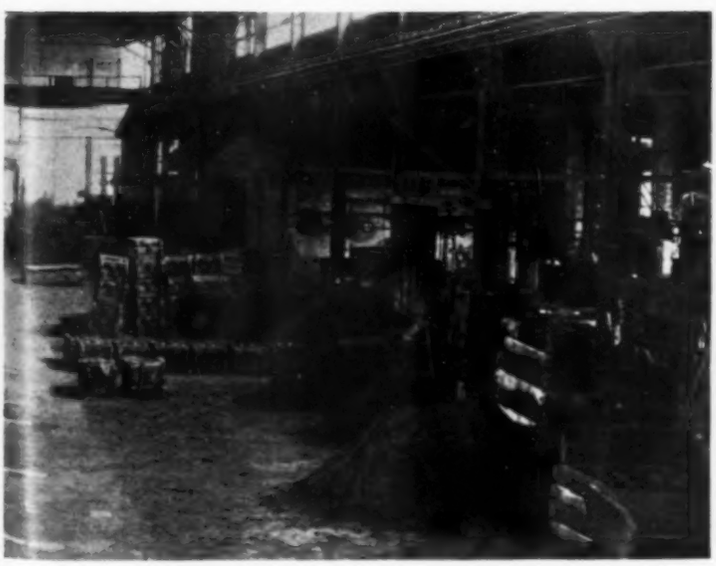
Fig. 3—One of the Sandblasting Machines

By Norman J. Hindle

OPERATIONS

layout of the plant is shown in Fig. 11. The office which contains the executive, sales, cost, engineering and production departments, is built of brick and is well lighted.

When an order comes to the plant it is assigned a number, and copies of the order immediately are delivered to the production, pattern and shipping departments. The pattern department puts a tag on the pattern and prepares it for production. The pattern storage is situated at the rear of the office building. It is of fireproof construction, built of steel and brick, with all steel shelving and contains approximately 25,000 patterns. A card index is kept of the patterns and the space in the storage is separated into divisions which are numbered and lettered. Small patterns are stored on shelves that are divided into compartments about 30 inches square. Although several patterns may be stored in one of these divisions, it is an easy matter to identify the one that is wanted by the pattern number.



Machine and the Electric Furnace in the Background

Large patterns occupy about half the first floor and the whole of the second floor. These are designated and located by numbers in the same manner as the small patterns. The pattern storage is illustrated in part in Fig. 7.

When the pattern clerk receives an order for a certain casting, he consults the card index which gives the exact location of the pattern. The pattern is inspected and if any changes or repairs are necessary it is taken to the pattern shop. Here the corrections are made and the pattern again is inspected. If correct, it goes to the foundry for production.

The pattern shop is at the rear and in the same building with the pattern storage. It is well lighted and sufficiently large for the amount of work that is necessary. It contains a lathe, disk grinder, band saw, jointer and planer, all purchased from the J. A. Fay & Egan Co., Cincinnati. A covered runway connects the pattern shop with the foundry.

The foundry building runs north and south and is of brick and steel construction. The melting department is situated in the north end of the building on the east side of the main gang-

Fig. 5—A Section of the Coreroom Is Devoted to Inspection and Pasting of Cores

way which occupies the middle of the north half of the building. On the opposite side of the gangway is a sand slinging machine. This piece of equipment is used to aid in molding the larger castings made by the company. South of this machine and the floor it serves is the floor molding department. This is illustrated in Fig. 4. That section of the foundry extends to the shakeout on both sides of the gangway with the exception of that area at the front of the furnace that is devoted to ladle preparation and the transferring of sand to the molding floors.

Describes Foundry Layout

Bench molds are made along the west wall of the building near the floor molding department. The sand for the floor molders is prepared along the east wall opposite that section. The coreroom is directly south of the sand preparation equipment and extends past the center of the building. An addition recently has been built to the coreroom which projects from the east side. The shakeout is located about the center of the main gangway at the end of the floor molding department. The sand reclaimer is to the right and west of the shakeout. The remainder of the building is occupied by the cleaning, finishing and annealing departments. An addition recently was built at the south end of the building on the west side for an extension of the production facilities.

All floor molding is done with the use of pneumatic rammers, the sand-slinging machine and bumper equipment. The pneumatic rammers were made by the Chicago Pneumatic Tool Co., New York. After final inspection of the pattern in the pattern department it is passed to the flask department where the correct flask is noted and pattern and flask are delivered to the molder. Three overhead cranes serve the main gangway of the foundry building. One has a 7½-ton capacity and was made by the Milwaukee Electric Crane & Hoist Corp., Milwaukee; another is a 5-ton crane manufactured by the Cleveland Crane & Engineering Co., Wickliffe, O., and the third is a 3-ton crane supplied by the Euclid Crane & Hoist Co., Euclid, O.

When the molding operation is complete the pattern is removed from the mold and the molder patches, finishes the mold and sets the cores. After closing the mold, he sets the runner cup and prepares the mold for pouring. Each molder makes and finishes his molds completely. Flasks used on the floor are made by the company. Sand is delivered to the floors by cranes equipped with dump buckets and piled between floors in such a manner that two molders use sand from the same pile. Jibs with air hoists are located along the floor molding section and each serves two or more floors.

Tonnage in the foundry of the Farrell-Cheek Steel Foundry Co. is divided about equally between bench and floor work. Molds in the bench department are prepared on molding machines of the squeezer type supplied by Milwaukee Foundry Equipment Co., Milwaukee, and Wm. H. Nicholls Co. Inc., Richmond Hill, Long Island, N. Y. The bench molders also finish their molds and set the cores, as do the floor molders. The company also makes the snap flasks used in this department. Sand for the bench molders is mixed in a sand mill situated at the south end of the section and made by the National Engineering Co., Chicago. It is delivered to the floors by monorail from the mill and placed in metal bins near each machine. The monorail was supplied by the American Monorail Co., Cleveland.

Mills the Sand

When the molds are ready for pouring, they are placed at the rear of the molding machines and in rows along the floor in the bench molding section. In the floor molding department they are placed in rows as they are finished. Molds are poured as soon as possible after they are ready which is not difficult when a heat is tapped from an electric furnace every 55 minutes or less. The floor molds are not so large that they cannot be handled easily when, as has been previously stated, castings seldom exceed 500 pounds in weight.

Sand for the floor molding department is prepared in a place provided for that purpose to the left of the molding floor, looking south in the foundry. Two mills made by the Phillips & McLaren Co., Pittsburgh, mix the sand. Sand, fireclay and dry binders are stored at the rear of the machines. Sand is unloaded directly from the cars into the storage bins close to the mills by a locomotive-type crane made by the Browning Crane Co., Cleveland. Binding materials are stored near the sand bins. Bins for materials are placed conveniently near the mills. After the mixture

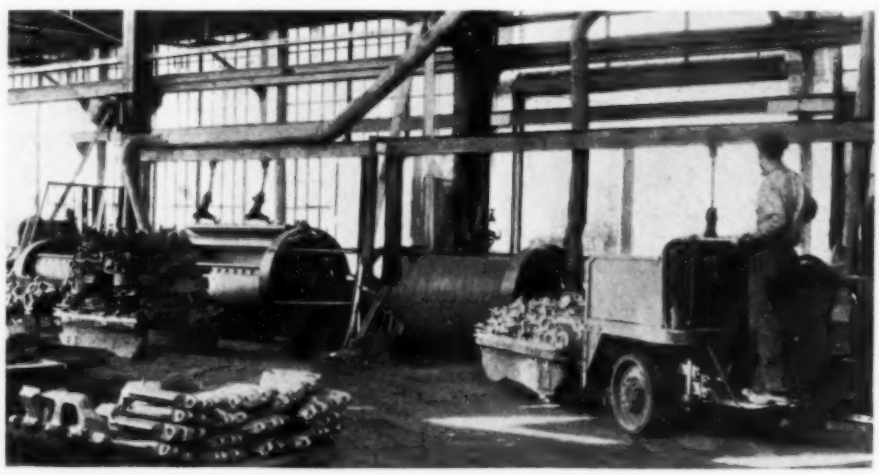


Fig. 6—Castings Are Cleaned in Tumbling Barrels After Heat Treatment

has been milled for the proper length of time, it is dumped from the mill through a chute located in the pan of the mill into a bucket suspended from a monorail. It then is taken on the monorail to a dump bucket which transports it to the molding floors.

Another sand mill, south of the two previously described, and made by the National Engineering Co., Chicago, mixes the sand for the coreroom. Constituents of the mix are easily accessible for this mill. When the sand has been thoroughly mixed, it is dumped into a bucket suspended from a monorail and transported to the coreroom where it is dumped into a large sheet metal container. It is distributed from there to the coremakers.

Fig. 8—Shakeout Is Situated at the Center of the Building

Uses Car Type Ovens

The coreroom occupies a space 25 x 80 feet south of the sand mills and along the east wall of the foundry. Recently an addition was built to this department 50 x 60 feet in which the smaller cores are made. Fig. 10 shows a part of the new coreroom. The new section is of concrete and steel construction and is well lighted and ventilated. In addition to being supplied with coremakers' benches, it is equipped with two car type core ovens. Each has a capacity of two cars. These ovens were made by the American Blower Co., Detroit, and are oil fired. They are used for baking the larger cores made in the department.

The older part of the department contains a car type core oven made by the same firm as the others and a large drawer type oven consisting of four batteries of five drawers each. This oven is used for baking the smaller cores and is oil fired. A core machine made by the Wadsworth Core Machine & Equipment Co., Akron, O., makes many of the stock cores. Large cores are made on rails at the north end of the room. An air hoist is located at a convenient spot to load the large cores on the cars before they are placed in the ovens. The drawer type oven referred to previously occupies a space at the center of the room. The south end of the coreroom is used as a core storage. A space also is devoted to inspection and pasting.

The shakeout is located to the right of the coreroom. Here the castings are knocked from the flasks by men supplied with wooden mallets. The castings then are separated from the sand, the sand going through the reclaimer situated at the right of the shakeout on the west side of the building. Here the dust, fines, gaggers, shot and refuse are separated from the good sand which is returned to the foundry for use. The castings are taken either to the sprue cutting machine or the place allotted for oxyacetylene cutting, depending on the size of the casting and the risers and gates. These operations are performed near the shakeout.

The metal for the castings is melted in an electric furnace made by the Pittsburgh Electric Furnace Corp., Pittsburgh. It is a 3-ton, acid type and is located at the extreme north end of the foundry building. Drop forge automotive and machine shop scrap is used in the charge. Scrap is stored inside in a 1000-ton bin located at the left of the furnace. It is unloaded from the cars directly into the bin through doors in the roof by a locomotive crane and magnet Ferroalloys, aluminum, iron ore, etc., are easily accessible to the furnace men. A roof for the furnace is held in reserve in case the one in the furnace should burn through or need repairs.

Charge the Furnace

Charges for the furnace are loaded into wheelbarrows, weighed and dumped into chutes that are used to put the scrap in the furnace. These chutes are long and narrow, being the width of the furnace door. After the proper amount of scrap has been loaded into them, and the furnace has been tapped, the furnace is titled and the chutes raised by a crane and tilted to the proper position for the scrap to slide into the furnace. Only two chutes are required for the charge. This method of charging is rapid as only 5 minutes are required from the time the furnace is tapped to the time the electric current is turned on for melting the next charge.

The scrap in the charge is proportioned so that it will melt approximately at the proper carbon content. The chemist runs a preliminary test for carbon on each heat when it is melted and if the charge should melt

Fig. 7—Pattern Storage Is of Fireproof Construction

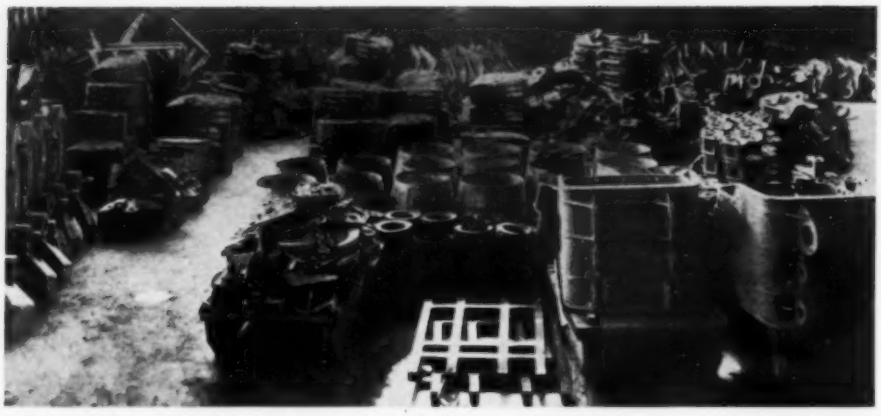


Fig. 9—Certain Castings Are Kept in Storage for Quick Delivery

too low, pig iron is added to the bath. If it melts too high in carbon, iron ore is added to reduce it. Metal is melted and raised to the proper temperature in the furnace and then tapped into a 3-ton ladle for distribution. All ladle equipment used in the shop was made by the Whiting Corp., Harvey, Ill., and all ladles are of the lip pouring type. Ferroalloy additions are made in the furnace and in the ladle as the heat is being tapped, and aluminum is used as the deoxidizing agent.

As has been stated previously, the Farrell-Cheek Steel Foundry Co., makes a carbon and an alloy steel. The carbon steel has an analysis that averages approximately as follows: carbon 0.20 to 0.50, as desired by customer; manganese, 0.72 per cent; silicon, 0.35 per cent and phosphorus and sulphur as low as possible, generally about 0.033 per cent. The special alloy steel has high wear resistance properties. Close check is kept of all scrap that comes into the plant. Only the best possible scrap is purchased for melting and the company pays a price in excess of the market to secure it. Before a car is unloaded, the chemist runs an analysis. If the car does not come up to specifications it is rejected. Electricity for the furnace is supplied by the local electric power company. About 40 tons of metal is melted daily which means a heat must be tapped about every 55 minutes.

Explains Pouring Practice

After the heat has been tapped into the 3-ton ladle, it is transported by the 7½-ton capacity overhead crane to a point between the bench and the floor molding floors where a hook is suspended from one of the I-beams of the building. The ladle is hung on the hook and the metal is distributed to the various pouring gangs from that point. Ladle equipment used in this foundry consists of two 3-ton, one 1-ton, three 500-pound and eight 200-pound ladles. A gang of specially trained men do all the pouring of the metal. Small castings made by the bench molders are poured from 200-pound capacity ladles mounted on a special rig suspended from the monorail which traverses the length of the bench floor. The pouring device was made by the Modern Pouring Device Co., Port Washington, Wis.

Molds for castings up to 500 pounds in weight are poured from the 500-pound capacity ladles and larger molds are poured from the 1-ton capacity ladle. The smaller ladles are filled from the 3-ton ladle into which the heat was tapped. That ladle is of the worm gear type.

Method Is Flexible

According to the management, this method of distribution is more flexible than if the metal were poured from a bottom-pour ladle. It also is of the opinion that the metal can be poured faster by the method used in this shop.

As soon as the metal has set sufficiently in the molds ,the flasks are taken to the shakeout where men equipped with wooden mallets knock the castings from the molds. After the castings have cooled sufficiently, they are taken from the shakeout either to the sprue cutting machine, if the sprues and risers are small and the casting is easily handled, or to the space allotted to cutting off the sprues and risers with the oxyacetylene torch. After these have been removed, the castings are sent to the sandblast. Here they are cleaned in one of three machines made by the Pangborn Corp., Hagerstown, Md., depending on their size. One of the machines is of the continuous rotary table type, another is a car type and the third is a cabinet type sandblast.

Locates Cleaning Department

When the castings have been sandblasted, they are loaded on skid platforms and transported to the chipping department by electric trucks. The chipping and grinding departments occupy the space at the rear of the shakeout across the entire building. Small castings are chipped and ground along the east wall of the building and the larger castings are cleaned in the gangway and along the west wall. Small castings are chipped on benches of such height that while leverage on the tools is secured, much of the backbreaking labor is eliminated. Tools used in the chipping department were supplied by the Chicago Pneumatic Tool Co., New York.

The castings are taken from the skid platforms on which they were delivered, chipped and placed on other platforms. When the platforms containing the finished work are filled, they are taken either to the grinders, or, if they have some minor defect, are transported to the welding department. The welding department is situated in the main gangway to facilitate moving the larger castings

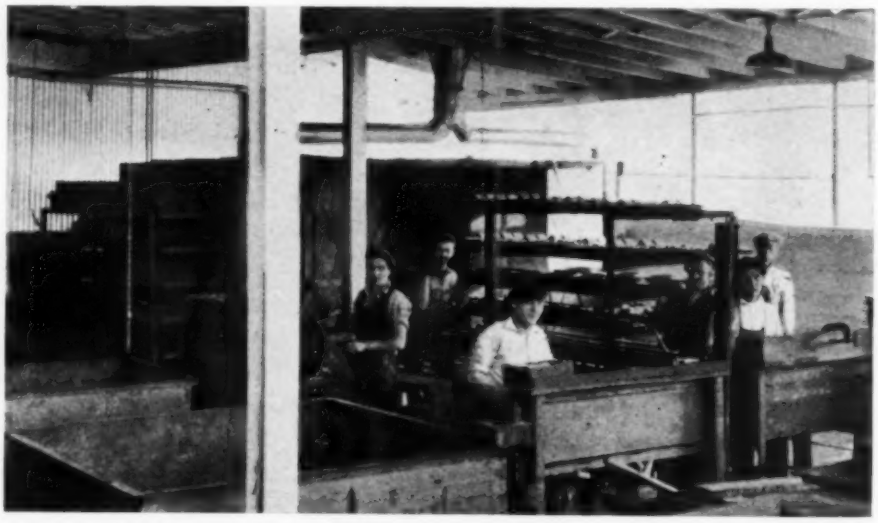


Fig. 10—Section of New Addition to the Coreroom Showing the Various Departments

with the crane. Swing frame grinders, made by the company, are located along the west wall of the building. Here the larger castings are ground. The chipping of the larger castings is carried out in close proximity to the swing grinders. This layout gives a compact arrangement for all cleaning operations. One thing that is noticeable is the fact that all grinders, both the swing frame and the stand type are powered by individual motors. The stand grinders for small castings were made by the Safety Emery Wheel Co., Springfield, O. Three air compressors manufactured by the Ingersoll-Rand Co., New York, supply air for the various pneumatic tools used throughout the foundry.

Heat Treat the Castings

After all castings have been chipped and ground, they are sent to the heat treating department. The heat treatment is carried out in two, oil-fired, car-type, furnaces provided with temperature control. One of the furnaces has a 15-ton capacity and the other 10-ton. After the heat treating process all castings are resandblasted and tumbled. After this the castings are inspected and when ready for shipment the carbon steel castings pass into the shipping room and the special alloy steel castings go to a departmental building for further heat treatment. This latter building is a recent addition to the main foundry building at the southwest end. It is 60 x 100 feet and is of brick and steel construction, well ventilated and lighted. A craneway extends the length of the building, and supports a 2-ton traveling crane made by the Euclid Crane & Hoist Co., Euclid, O.

When the heat treatment of the castings has been completed the small castings are tumbled in barrels made by the W. W. Sly Mfg. Co., Cleveland. There are five of these tumbling barrels, two are large size and the others are small. The larger castings are returned to the sandblast for finishing. After these operations have been completed, the castings are given a rigid inspection and are shipped. Inspection is carried out all along the production line. It costs money to perform operations on castings that finally must be scrapped and for that reason close inspection is necessary to stop work on defectives as early as possible in the production cycle.

The laboratory is situated in a separate building north of the main foundry building. A carbon determination is required when each heat is melted and the incoming scrap must be analyzed. The company continually carries on research work and its results are checked periodically.

Castings made in certain grades of the special alloy steel made by the company are extremely difficult to machine after their final heat treatment. For that reason the company maintains a machine shop equipped with 3 lathes, a shaper, boring mill, radial drill, a 4-spindle and two single spindle drills, and a key seater. Here castings that must be machined have the operations performed before they are given the final heat treatment. The building where these operations are carried out is located on the east side of the foundry building and is a brick and steel structure separated from the main building by a spur track from the New York Central railroad. Near this building is the reserve sand supply and at the south are four oil storage tanks with a capacity of 30,000 gallons and one smaller tank for storing core oil.

The extreme south end of the main foundry building is used as a storage place for castings. Certain firms to which the company supplies castings have given it permission to make a certain number of specified castings to be kept in stock in excess of those ordered. When an order comes in for a certain number of castings among those that are in storage, they are shipped immediately from the stock and the order goes through the regular process of manufacture. When those castings are completed they are put in stock to take the place of those that have been shipped. A perpetual inventory is kept of the castings in stock. That arrangement allows quick delivery to the consumer and affords him good service which he is willing to pay for in further orders.

A view of the casting storage space may be seen in Fig. 9. That illustration also gives some idea of the different kinds of castings made by the Farrell-Cheek Steel Foundry Co. It will be noted that these are of relatively small size.

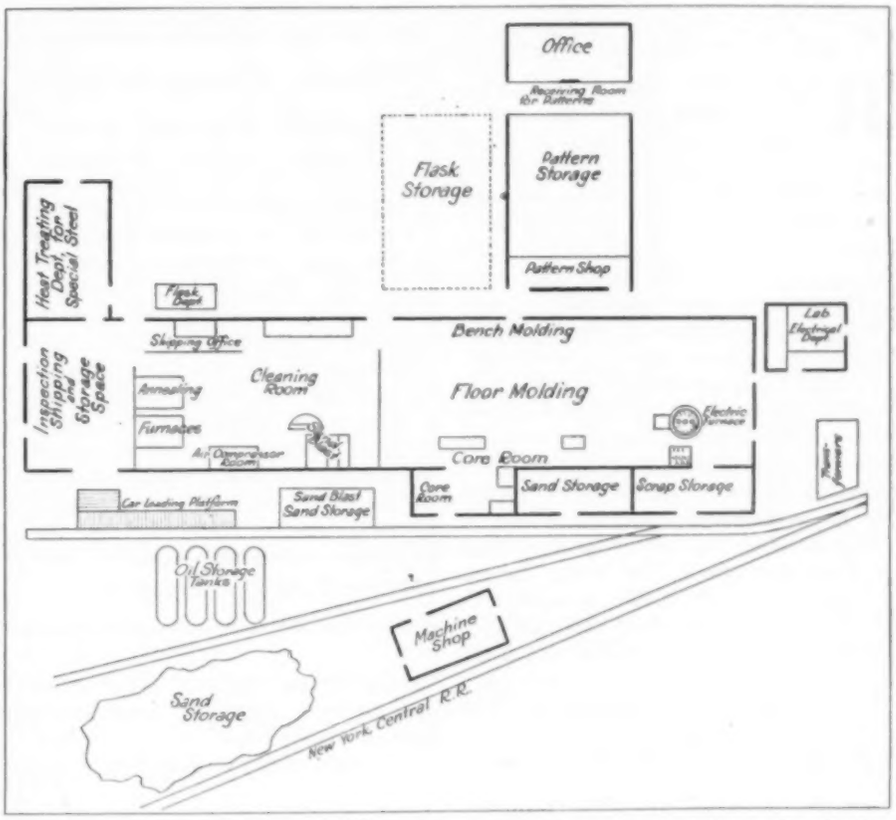


Fig. 11—Layout of Steel Foundry and Adjacent Buildings Used for Storage, etc.

Issues Bulletin on Gas

American Gas association has issued a bulletin on the statistics of the manufactured gas industry in the United States during the year 1928. Charts show the monthly coke production for several years, production of various fuels in the United States, amounts and kinds of gas produced and purchased, sales of gas, etc. The bulletin also contains many tables of consumption and production of gas.

Refining plants in the United States in 1928 produced 5,573,050 pounds of casting copper and 179,104,311 pounds of Lake copper Secondary smelters produced 41,322,776 pounds of casting copper and 191,323,029 pounds of electrolytic copper.

Fig. 9—Certain Castings Are Kept in Storage for Quick Delivery

too low, pig iron is added to the bath. If it melts too high in carbon, iron ore is added to reduce it. Metal is melted and raised to the proper temperature in the furnace and then tapped into a 3-ton ladle for distribution. All ladle equipment used in the shop was made by the Whiting Corp., Harvey, Ill., and all ladles are of the lip pouring type. Ferroalloy additions are made in the furnace and in the ladle as the heat is being tapped, and aluminum is used as the deoxidizing agent.

As has been stated previously, the Farrell-Cheek Steel Foundry Co., makes a carbon and an alloy steel. The carbon steel has an analysis that averages approximately as follows: carbon 0.20 to 0.50, as desired by customer; manganese, 0.72 per cent; silicon, 0.35 per cent and phosphorus and sulphur as low as possible, generally about 0.033 per cent. The special alloy steel has high wear resistance properties. Close check is kept of all scrap that comes into the plant. Only the best possible scrap is purchased for melting and the company pays a price in excess of the market to secure it. Before a car is unloaded, the chemist runs an analysis. If the car does not come up to specifications it is rejected. Electricity for the furnace is supplied by the local electric power company. About 40 tons of metal is melted daily which means a heat must be tapped about every 55 minutes.

Explains Pouring Practice

After the heat has been tapped into the 3-ton ladle, it is transported by the 7½-ton capacity overhead crane to a point between the bench and the floor molding floors where a hook is suspended from one of the I-beams of the building. The ladle is hung on the hook and the metal is distributed to the various pouring gangs from that point. Ladle equipment used in this foundry consists of two 3-ton, one 1-ton, three 500-pound and eight 200-pound ladles. A gang of specially trained men do all the pouring of the metal. Small castings made by the bench molders are poured from 200-pound capacity ladles mounted on a special rig suspended from the monorail which traverses the length of the bench floor. The pouring device was made by the Modern Pouring Device Co., Port Washington, Wis.

Molds for castings up to 500 pounds in weight are poured from the 500-pound capacity ladles and larger molds are poured from the 1-ton capacity ladle. The smaller ladles are filled from the 3-ton ladle into which the heat was tapped. That ladle is of the worm gear type.

Method Is Flexible

According to the management, this method of distribution is more flexible than if the metal were poured from a bottom-pour ladle. It also is of the opinion that the metal can be poured faster by the method used in this shop.

As soon as the metal has set sufficiently in the molds ,the flasks are taken to the shakeout where men equipped with wooden mallets knock the castings from the molds. After the castings have cooled sufficiently, they are taken from the shakeout either to the sprue cutting machine, if the sprues and risers are small and the casting is easily handled, or to the space allotted to cutting off the sprues and risers with the oxyacetylene torch. After these have been removed, the castings are sent to the sandblast. Here they are cleaned in one of three machines made by the Pangborn Corp., Hagerstown, Md., depending on their size. One of the machines is of the continuous rotary table type, another is a car type and the third is a cabinet type sandblast.

Locates Cleaning Department

When the castings have been sandblasted, they are loaded on skid platforms and transported to the chipping department by electric trucks. The chipping and grinding departments occupy the space at the rear of the shakeout across the entire building. Small castings are chipped and ground along the east wall of the building and the larger castings are cleaned in the gangway and along the west wall. Small castings are chipped on benches of such height that while leverage on the tools is secured, much of the backbreaking labor is eliminated. Tools used in the chipping department were supplied by the Chicago Pneumatic Tool Co., New York.

The castings are taken from the skid platforms on which they were delivered, chipped and placed on other platforms. When the platforms containing the finished work are filled, they are taken either to the grinders, or, if they have some minor defect, are transported to the welding department. The welding department is situated in the main gangway to facilitate moving the larger castings

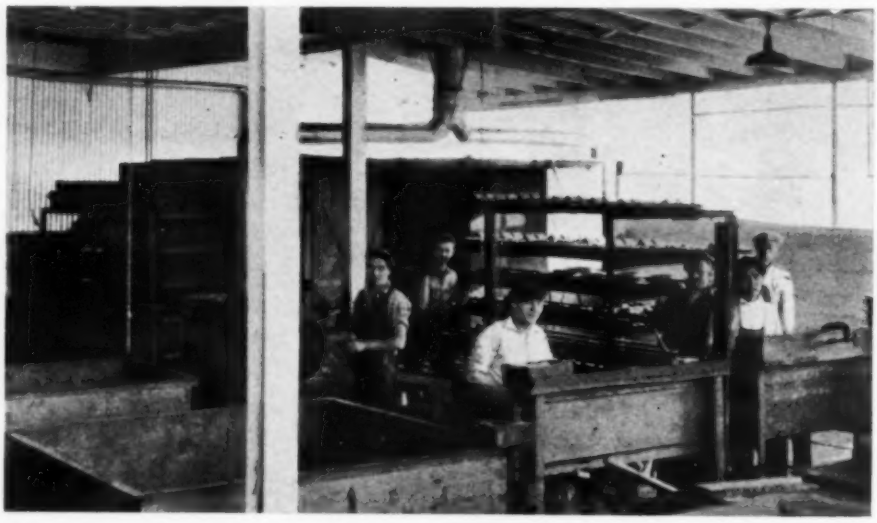


Fig. 10—Section of New Addition to the Coreroom Showing the Various Departments

with the crane. Swing frame grinders, made by the company, are located along the west wall of the building. Here the larger castings are ground. The chipping of the larger castings is carried out in close proximity to the swing grinders. This layout gives a compact arrangement for all cleaning operations. One thing that is noticeable is the fact that all grinders, both the swing frame and the stand type are powered by individual motors. The stand grinders for small castings were made by the Safety Emery Wheel Co., Springfield, O. Three air compressors manufactured by the Ingersoll-Rand Co., New York, supply air for the various pneumatic tools used throughout the foundry.

Heat Treat the Castings

After all castings have been chipped and ground, they are sent to the heat treating department. The heat treatment is carried out in two, oil-fired, car-type, furnaces provided with temperature control. One of the furnaces has a 15-ton capacity and the other 10-ton. After the heat treating process all castings are resandblasted and tumbled. After this the castings are inspected and when ready for shipment the carbon steel castings pass into the shipping room and the special alloy steel castings go to a departmental building for further heat treatment. This latter building is a recent addition to the main foundry building at the southwest end. It is 60 x 100 feet and is of brick and steel construction, well ventilated and lighted. A craneway extends the length of the building, and supports a 2-ton traveling crane made by the Euclid Crane & Hoist Co., Euclid, O.

When the heat treatment of the castings has been completed the small castings are tumbled in barrels made by the W. W. Sly Mfg. Co., Cleveland. There are five of these tumbling barrels, two are large size and the others are small. The larger castings are returned to the sandblast for finishing. After these operations have been completed, the castings are given a rigid inspection and are shipped. Inspection is carried out all along the production line. It costs money to perform operations on castings that finally must be scrapped and for that reason close inspection is necessary to stop work on defectives as early as possible in the production cycle.

The laboratory is situated in a separate building north of the main foundry building. A carbon determination is required when each heat is melted and the incoming scrap must be analyzed. The company continually carries on research work and its results are checked periodically.

Castings made in certain grades of the special alloy steel made by the company are extremely difficult to machine after their final heat treatment. For that reason the company maintains a machine shop equipped with 3 lathes, a shaper, boring mill, radial drill, a 4-spindle and two single spindle drills, and a key seater. Here castings that must be machined have the operations performed before they are given the final heat treatment. The building where these operations are carried out is located on the east side of the foundry building and is a brick and steel structure separated from the main building by a spur track from the New York Central railroad. Near this building is the reserve sand supply and at the south are four oil storage tanks with a capacity of 30,000 gallons and one smaller tank for storing core oil.

The extreme south end of the main foundry building is used as a storage place for castings. Certain firms to which the company supplies castings have given it permission to make a certain number of specified castings to be kept in stock in excess of those ordered. When an order comes in for a certain number of castings among those that are in storage, they are shipped immediately from the stock and the order goes through the regular process of manufacture. When those castings are completed they are put in stock to take the place of those that have been shipped. A perpetual inventory is kept of the castings in stock. That arrangement allows quick delivery to the consumer and affords him good service which he is willing to pay for in further orders.

A view of the casting storage space may be seen in Fig. 9. That illustration also gives some idea of the different kinds of castings made by the Farrell-Cheek Steel Foundry Co. It will be noted that these are of relatively small size.

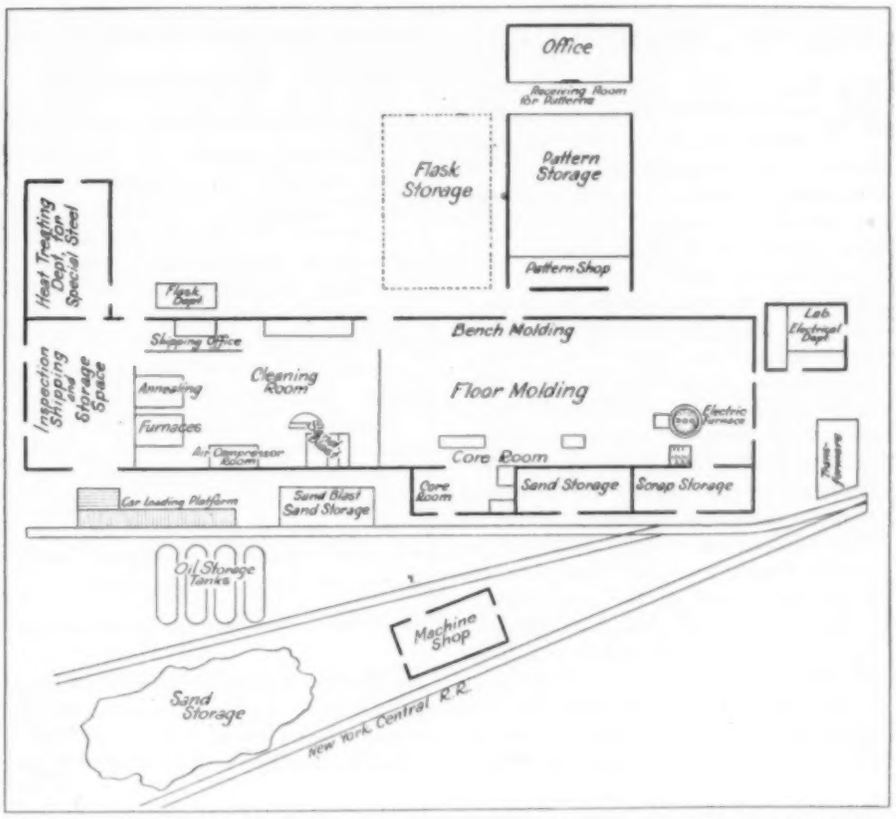


Fig. 11—Layout of Steel Foundry and Adjacent Buildings Used for Storage, etc.

Issues Bulletin on Gas

American Gas association has issued a bulletin on the statistics of the manufactured gas industry in the United States during the year 1928. Charts show the monthly coke production for several years, production of various fuels in the United States, amounts and kinds of gas produced and purchased, sales of gas, etc. The bulletin also contains many tables of consumption and production of gas.

Refining plants in the United States in 1928 produced 5,573,050 pounds of casting copper and 179,104,311 pounds of Lake copper Secondary smelters produced 41,322,776 pounds of casting copper and 191,323,029 pounds of electrolytic copper.

BRITISH FOUNDRYMEN *Cast* *Variety of Alloys*

Part IV—White Metals

States Compositions

ALLOYS containing predominating amounts of lead or tin generally are referred to as white metals and are used for a variety of purposes including bearings, die-castings, printing metals and chemical castings. While a standard for babbitt bearing metals exists in the United States, the author states that he does not know of any in Great Britain except that for British admiralty white metals. In this article which is the fourth of a series relating to alloys cast in Great Britain, the author presents analyses and uses of white metal alloys.

By Thomas H. Turner

RELATIVELY low melting point white metal alloys are used in many industries and in great variety of compositions. Antifriction alloys, printing metals, die-casting alloys and solders form the principal grouping of such alloys. The accompanying tables have been compiled from the data obtained, to show alloys of these types known to be in use at the present time.

It will be noted that copper generally is present in antifriction metal, but not in printers' metals, except in the case of founders type. In all other printers' metals, copper is regarded as an undesirable impurity which is likely to clog the nozzles of the type-casting machines. The really astonishing differences in the compositions of these alloys are due, nominally, to variations in working speeds and loads for similar classes. Greater knowledge of the engineering requirements and metallurgical fundamentals probably will lead to simplification, by eliminating certain alloys in favor of other standardized alloys of approximately similar compositions and properties.

The author has no knowledge of any British Engineering Standards association standards for bearing metals, but he may state that the British admiralty white metal is specified as to contain: Antimony, 8 to 9 per cent; copper, 7 to 2 per cent, and tin, remainder, being normally antimony, 9 per cent, copper, 7 per cent and 84 per cent tin. Zinc is used in admiralty underwater metal and it contains: Zinc, 29 per cent; copper, 1 per cent and tin, 70 per cent. A less used white metal known as *B* contains: Antimony, 9 per cent; copper, 6 per cent and tin, 85 per cent.

Accompanying tables contain the compositions of binary, ternary or quaternary tin or lead-base alloys made or specified by engineering concerns of all kinds in Great Britain. Despite the large number of these alloys, the lists cannot be claimed to be exhaustive.

In addition to the many tin or lead-base alloys listed, at least one still more complex bearing metal is being

Table XXVI

Tin More Than 50 Per Cent

(Cf. Tables XXVII & XXXI)

Composition Per Cent				
Sn	Sb	Pb	Cu	Uses for alloys
93	3.5	....	3.5	2, 3, 4, 5, 11, 25
88	8	0.5*	3.5	12
86	11	....	3	3, 5, 8, 11, 25
86	9.5	0.5	4	3
85	9	....	6	33
85	8.5	1.5	5	3, 4, 5, 13
84	9	....	7	33
84	8	....	8	23
82	11	6	1	31
82	11	1	6	30
81.5	10.5	2.5	5.5	29
80.5	8.5	6.5	4.5	25
80	12	1	7	2, 7, 11 ,12, 14, 29
80	10	7	3	5, 7, 11, 23
78	10	2	10	25, 29
77	3	17	3	25
76	10	8	6	17
75	12	7	6	8, 25
75	10	6	9	5, 7
74	7	14	5	25
70	....	29**	1	33
64	11	22	3	6, 9, 10, 11, 12, 13, 25
60	12	25	3	6, 7, 12, 13, 14, 15, 18, 23, 24, 25, 29
60	12	22	6	31
60	10	28	2	8, 29, 30, 31
60	....	38**	2	24
52	10.5	33	4.5	5, 7, 12, 13, 29

*Bismuth.
**Zinc.

Table XXVII

Tin Less Than 50 Per Cent

(Cf. Tables XXVI & XXXI)

Composition Per Cent				
Sn	Sb	Pb	Cu	Uses for Alloys
48.5	10	40.5	1	26
47.5	10	41.5	1	30
45	15	38	2	7, 9, 11, 15, 16, 21, 23, 26, 29
40	10	48.5	1.5	6, 15, 16, 18, 20, 23, 25
40	10	48	2	31
35	12	52	1	17
26	15	57	2	10, 12, 13
20	17	63	....	27, 28
20	16	63	1	30
20	15	65	....	10, 16, 17
20	15	64.25	.75	13, 27, 28, 30, 31
18	14	67.5	.5	16, 30, 31
11	15	74	....	1, 19, 20, 21, 22, 31
10	15	74.5	.5	1, 27, 28
10	....	–90 Zn.	....	20
7	12	79	2	1, 18, 20, 30, 31
5	15	80	....	20, 21, 22, 28
5	3	92	....	32
4	20	76	....	22
3.5	16	79.5	1	30, 31
3	11	86	....	22
2	15	82	1	31
....	13	87	....	22
....	20	80	....	32

used in Great Britain by many well-known concerns. This is a lead-base alloy with a high antimony content, relatively low tin content, and intentional additions of appreciable quantities of nickel, cadmium, phosphor-copper, and a smaller amount of arsenic. This new nickel-hardened bearing metal, of German origin, only has been introduced into local works during the last five years. It compares favorable as regards hardness and other properties, with more expensive tin-rich alloys, and for many purposes can replace those containing up to about 85 per cent tin. It is being used largely for the bigger type of bearings in which the white metal lining is keyed into the shell. Its brinell hardness is 26 at 20 degrees Cent. and 13 at 120 degrees Cent. It thus is harder than ordinary lead-base alloys, and retains its hardness better at high service temperatures. Melted under charcoal in the normal manner, it is cast from 480 to 520 degrees Cent. Its specific gravity is 9.88 and its contraction 0.55 per cent.

Although type founding is a specialized art outside the experience of most foundrymen, great quantities of type metals are melted and cast each day. Typical alloys used for this purpose will be found in Table XXVIII.

Plunger operated, pressure machine die-castings of special tin-antimony alloys are used for gas meter parts, being produced with a high degree of accuracy. Table XXIX shows the compositions of some of those known to be used.

Most plunger operated pressure machine die-castings appear to be made from zinc-base alloys of types as follow. One contains 7 to 10 per cent tin; 4 to 7 per cent copper; 0.5 to 0.10 per cent aluminum and the remainder zinc. This alloy is used where greatest dimensional accuracy is required and has an ultimate tensile strength of 22,400 pounds per square inch. The other alloy contains 3 to 5 per cent copper; 4 to 4.5 per cent aluminum; traces of tin and the remainder is zinc. This alloy is used where strength and toughness are important, and has an ultimate tensile strength of 42,560 pounds per square inch. They are used extensively for instrument parts, automobile accessories, camera, cinematograph, radio, phonograph and other such domestic or engineering mechanisms.

Solders specified by big users in the part have varied widely, under such old-established names as plumber's solder, tinman's solder and common solder. In view of the high cost of tin, it is good that the specifications given in Table XXX now exist for all to use.

Lead and lead-rich alloys are used widely in the chemical industries, and for such purposes their purity is of great importance. The metallic lead content of *chemical* lead actually is specified as 99.99 per cent, but, un-

Table XXIX

Alloys Used for Gas Meter Parts

Composition Per Cent Sn	Sb	Pb	Cu	Type of meter	Alloy used for:—
91.8	8.2	.....	.....	Wet	Measuring drums
90	6	4	.....	Dry	Crank arms
80	.....	2.8	17.2	Dry	Cranks
70	30	.....	.....	Dry	Covers
68	32	.....	.....	Dry	Grating Metal
66.6	33.3	.....	.....	Dry	Valve Grids and Covers
65	35	.....	.....	Dry	Somewhat harder ditto
64	36	.....	.....	Dry	Cover Metal
32.4	5.0	59.9	0.65 Fe	Dry	Valves
10	6	84	.....	Dry	Rod studs, crank studs, motion wire guides, rollers, tees and valve guides.
Also a copper rich alloy					
17.2	.....	2.8	80	Wet	Drum shafts and bearings.

Table XXX

Soft Solders Used in Great Britain

(B.E.S.A. No. 219—1925)

(Soft solders must contain no aluminum or zinc, not more than 0.02 per cent iron and not more than 0.05 per cent arsenic)

	Composition Per Cent Tin	Lead	Antimony	Maximum impurities	Uses
A	64-66	Remainder	1.0	0.25	Low melting point Steel tubes
B	49.51	Remainder	2.5-3.0	0.25	Tinsmiths' and coppersmiths' fine work and bit soldering
C	39-41	Remainder	2-2.4	0.25	General work
D	29-31	Remainder	1.0-1.7	0.25	Plumbers' wiped joints
E	94.5-95.5	Remainder	0.5	0.25	Special electrical
F	49-51	Remainder	0.5	0.25	General electrical zinc and galvanized iron-work
G	41-43	Remainder	0.4	0.25	Dipping baths, zinc and galvanized iron-work. Tinned electrical joints.
H	34.36	Remainder	0.3	0.25	Lead cable wiped joints
J	29-31	Remainder	0.3	0.25	Dipping baths

Table XXVIII

Alloys for Casting Printers' Type

Composition Per Cent Sn	Sb	Pb	Names or Uses of these alloys which normally contain not more than 0.15% Cu, and no Fe, Al, As, Zn and S.
5-12	14-25	81-63	Monotype (345° C.-375° C.)
3-10	14-17	83-73	Stereotype (290° C.-345° C.)
2.5	10-15	88-80	Linotype (275° C.-295° C.)
12	24	Remainder	Type casting
12	20	Remainder	Type casting
12	17	Remainder	Monotype display
10	25	Remainder	Type casting and monotype display
10	19.5	70.5	Lanston monotype
10	18	71	Cu 1% Medium Founders' type
10	16	Remainder	Monotype display
10	15	Remainder	Rotary Stereotype
8	17	Remainder	Monotype and stereotype
8	16	Remainder	Flat stereotype
8	15	Remainder	Monotype
7	16	Remainder	Rotary
7	15	Remainder	Rotary and monotype
7	15	78	Standard Fine Art stereotype
7	14	Remainder	Rotary stereotype
6	16	Remainder	Monotype and flat stereotype
6	15	Remainder	Monotype
5	25	70	Poster type
5	15	80	Linotype
5	15	Remainder	Flat stereotype
4	15	81	Rotary stereotype
4	14	Remainder	Flat stereotype
4	13	Remainder	Linotype, Intertype, Typograph
4	11	Remainder	and Ludlow
3	13	84	Linotype
3	11	Remainder	
2	16	82	Rotary stereotype
2	12	Remainder	Linotype
2	10	Remainder	
2-12	10.25	63.88	Average analysis

Table XXXI

Antifriction Alloy Applications

(C. f. Tables XXVI & XXVII)

1. Agricultural Machinery
2. Air Compressors
3. Aircraft Engines
4. Explosion Engines (Diesel)
5. Explosion Engines (Motor Car)
6. Explosion Engines (Lorries)
7. Explosion Engines (Oil & Gas)
8. Steam Engines (H. Speed or Hyl. power)
9. Steam Engines (Medium speed and power)
10. Steam Engines (Medium or low speed and low power)
11. Steam Turbines
12. Dynamos (large)
13. Dynamos (Medium or Small)
14. Electric Motors (Large)
15. Electric Motors (Medium or Small)
16. Tramcar Axleboxes
17. Tramcar Armature Bearings
18. Centrifugal Pumps
19. Concrete Mixers
20. Stone Crushers
21. Lifts (Electric)
22. Line Shafting
23. Rolling Mills
24. Stern Tubes & Outer Brackets
25. Marine Steam Engines, Crosshead Conn. Rod and Main Bearings
26. Trawler Engines All Bearings
27. Fans and Ventilators
28. Sugar Machinery
29. Locomotive Bearings (all)
30. Railway Carriage Bearings
31. Railway Wagon Bearings
32. Metallic Packing Rings
33. Admiralty Work

less the purchaser has a special restriction regarding the copper content, the lead may be reduced by an amount not exceeding the amount of such copper. The maximum permissible impurities are stated in British Engineering Standards association specification 334-1928 which states that the maximum permissible impurities shall not exceed the following percentages: Copper, 0.05 per cent; bismuth, 0.005 per cent; iron, 0.003 per cent; silver, antimony and zinc, 0.002 in each case; nickel-cobalt, 0.001; and tin, cadmium, and arsenic may be indicated, but only in such minute quantities as to be negligible in comparison with other impurities.

Lead-rich alloys are used widely in the chemical industries under the name of regulus metal. With 7 per cent antimony present, the lead alloy is suitable for tanks, acid eggs, acid pans and other such containing vessels. Lead with 9 per cent antimony is used for valves, ejectors, acid pumps, plugs, pans and working parts which must withstand abrasion or other mechanical action. Parts which require to be machined all over, or threaded as screws, are cast from lead containing 11 per cent antimony.

Table XXXII

Regulus Metal

(B.E.S.A. 335—1928)

Pure lead, plus antimony per cent	Minimum U.T.S. lbs./sq. in.	Minimum Brinell hardness 500 Kg. & 10 mm.
6- 8	6,000	15
8-10	7,000	16
10-12	8,000	17
over 12	9,000	19

The British Engineering Standards association recently published a standard specification for such alloys, which contains useful recommendations as to their analysis, and describes suitable plain bend and reverse bend tests (carried out on a strip of cast alloy) by which the quality of regulus metal is judged. Regulus metals are essentially pure lead, with the specified percentages of antimony and permissible impurities as follow: Arsenic and zinc, 0.01 per cent maximum in each case; copper and tin, 0.10 per cent maximum in each case, and sulphur, 0.02 per cent maximum. The minimum tensile and hardness values for these antimony-lead alloys are given in Table XXXII.

Zinc Chloride Fluxes Aluminum

By James Silberstein

IN MELTING aluminum alloys in the foundry a certain amount of gates, risers, scrap castings, floor spillings and other similar material is returned to the melting pots. Since this returned material always contains more or less sand and dirt it becomes necessary to remove these foreign substances, which partly float to the surface, but also remain imbedded in the molten metal.

Zinc chloride generally is employed as a flux for cleaning aluminum alloys. When zinc chloride is stirred into the metal, a vigorous action takes place, with the result that the metal is freed from the dross and the dross floats to the surface where it subsequently is skimmed off. The metal should not be skimmed previous to fluxing. This would result in relatively large amounts of metal being drawn off along with the dross, since the metal and the dross are so intermixed that a separation is not practical. The action of zinc chloride is twofold: It reacts chemically with the aluminum and as a result the metal is freed from the adhering dross and dirt. Also, it forms gas which agitates the metal and carries the dross and dirt up to the surface of the metal bath.

The more the metal is contaminated with nonmetallic inclusions the more zinc chloride should be stirred into the metal. It is also evident that the zinc chloride should be stirred in thoroughly and to the bottom of the pot to bring about a cleaning to the largest possible extent.

Since zinc chloride rapidly absorbs moisture from the atmosphere, it should be kept in closed containers and not exposed in the open air previous to its use. Dangerous explosions caused by the sudden generation of steam will take place when moist flux is pushed under the surface of molten metal. It is a good practice to allow the zinc chloride to remain for a short time on the surface of the metal bath, before it is stirred in, so as to let any moisture escape. In this way there is no chance for accidents, since it is only when steam is formed below the surface of metal, that blowing and eruption of metal can take place.

Quite recently sodium silicofluoride has been introduced as a flux in place of zinc chloride. Sodium silicofluoride is stated to be cheaper per pound of material and to have the further advantage of not absorbing moisture. However its fluxing and cleaning action appears to be less energetic than that of zinc chloride, so that a larger amount of sodium silicofluoride has to be used. When introduced into the molten metal, sodium silicofluoride decomposes into sodium fluoride and silicofluoride. The latter compound is volatile and therefore causes upward currents in the metal resulting in suspended matter rising to the surface. It is probable that a chemical reaction also takes place between aluminum and silicofluoride. At any rate the gases formed upon using sodium silicofluoride as a flux are equally as harmful as the gases formed upon using zinc chloride and the same precautions should therefore be taken to protect the workmen handling the molten metal.

J. P. Devine Mfg. Co., Buffalo, has completed its new plant at Mt. Vernon, Ill., and is moving its operations and offices to that city.

Dry Molds for Ice Machine Castings

By Pat Dwyer

Fig. 1—Molds for large bases are dried in the floor

MOLDING activities are carried on in four of the eight bays into which the new foundry of the York Ice Machinery Corp., York, Pa., has been divided. Light and medium weight castings are molded on the floor, on the bench and on two machines made by the Osborn Mfg. Co., Cleveland, in the bay adjoining the core storage bay. All the castings made in this section, whether molded in snap flasks, wood flasks or in steel flasks on the machines, are poured in green sand. These castings include a wide variety of small miscellaneous parts which in service are not exposed to excessive strain and therefore are not required to conform to the high tensile, transverse and pressure tests imposed on many of the castings which enter into ice machinery construction.

The center bay of the foundry and the bay in which the cupolas are located at one end, is devoted to the production of medium and heavy weight castings. Molds for many of the medium weight castings are made on a plain jolt machine. Molds for large castings, as shown in Fig. 1 are made in the floor after the manner practiced for many years in gray iron jobbing foundries.

Explains Molding Methods

A course, open grade sand which enjoys a wide popularity in the eastern states, is used for facing sand on molds of this character. It also is used extensively in the cores which form the interior of this and other castings. The ends of the mold, part of the sides and all the interior are formed with a set of dry sand cores. With this arrangement a plain, flat, cast iron cope covers the mold satisfactorily and is held down by a number of long weights. The face of the mold is blackwashed and then the sand is dried to a depth of about 2 inches by baskets filled with burning coke, or charcoal. The mold is covered with thin steel sheets during the drying period of four or five hours, usually at night.

The pattern for this casting is of plain box frame construction with the round core prints at the sides attached temporarily, so that they may remain in the sand when the remainder, or main part of the pattern, is removed. Three bricks are rammed in the sand under each core print to reinforce the sand and furnish a solid bearing for the core. These side cores are fastened in place before the larger cores are lowered into place. The mold shown in Fig. 1 is for the base of one of the larger

Fig. 2—(Left) Water Jacketed Cylinder Molds Are Made and Dried in Rigid Cast Iron Flasks Without Bottom Plates.
Fig. 3—(Right) Molds Move on a Roller Conveyor From the Molding Machine to Where They May Be Finished and Loaded on the Oven Cars

Fig. 4—Small Cores in Great Variety Are Distributed From Storage Racks

vertical ice machines with a daily capacity of 400 tons of refrigeration. The casting is 5 feet 4 x 5 feet 8 x 12 feet 8 inches and weighs 27,235 pounds.

Anticipates Further Expansion

In anticipation of further expansion of the ice machinery business, this new foundry was designed, laid out and erected on a scale in excess of present requirements. Eventually it is expected that this excess capacity will be fully utilized for the company's products. In the meantime the policy of the company does not favor the introduction of outside work. Ice machinery is the specialty on which it concentrates and therefore any outside interests that tend to consume time and distract attention are not viewed with favor.

The bay in which the mold shown in Fig. 1 was made is spanned by two cranes, one of 20 tons and the other of 30 tons lifting capacity and therefore is in a position to handle castings outside the scope of any but the larger foundries. In the majority of instances, molds of this kind still are made largely by hand and require the services of highly skilled molders accustomed to this class of work.

Castings ranging in weight from 100 pounds to 2000 pounds are molded on machines in bays No. 6 and 7. The smaller castings are molded on machines supplied by the Osborn Mfg. Co., Cleveland, while the larger molds are formed under a sand slinging machine. All the molds are dried in a battery of four oil fired ovens made by the Foundry Equipment Co., Cleveland. The green molds are made in the north half of each of the bays designated. Later the dried molds are set up, cored, closed and poured on the south half of the same bays.

The sand slinging machine is of the stationary type. A flask with bottom board and pattern is placed under it by the crane. By manipulating the articulated arm, the operator directs a stream of sand, driven at high speed, into all parts of the flask until it is filled. The crane then removes the flask, rolls it over, removes the pattern, places the bottom board, pattern and another flask under the sand throwing machine and repeats this program indefinitely.

Fig. 6—The Patternshop is Exceptionally Well Lighted Through Windows in the Walls and Roof

Fig. 5—Core Sand is Distributed Through Chutes From a Gallery Which Surrounds the Small Core Department On Three Sides

In some instances half the split pattern is mounted in such a manner that the resulting mold may serve for either cope or drag, by the necessary adjustment of gates and runners. In other instances individual half patterns must be provided for cope and drag halves of the mold. In still other instances the drag is rolled over after it has been rammed and replaced under the machine. The cope half of the pattern and the cope part of the mold are adjusted in place and the cope is rammed full of sand while in that position. Usually several flasks and patterns are laid out in advance, so that the ramming machine can be kept busy, while the crane and attendants are engaged in lifting, pattern drawing, finishing the molds and loading them on the core

cars which are placed in the core oven.

Crane service has been eliminated to a great extent on the layout shown in Fig. 3. In its essentials it consists of a mechanical flask filler, a jolt rollover machine and two roller conveyors, one located at either end of the battery of drying ovens. The crane in bay No. 6 lifts the green molds from the conveyor to the oven cars, and later lifts the dried molds from the oven cars to the second roller conveyor. The crane in Bay No. 7 carries the dried molds from the end of the second conveyor to the setup floor where they are assembled and poured. The route taken by the molds is shown graphically in Fig. 12.

Heavy, cast iron flasks with the bars cast integral are employed with this unit. The bars are straight and shallow and therefore the flasks may be used on a wide variety of patterns. No bottom plates are used, a system which presents many advantages, including the time saved in drying the drags in the oven. In practice a predetermined number of drags are rammed, rolled, and placed on the conveyor. Then, if necessary, the pattern is changed and a corresponding number of copes are handled in a similar manner. The entire pattern equipment may be changed several times on any given day.

In the regular sequence of operation the flask is lifted by the crane and placed on the pattern plate attached to the table of the machine. To prevent the flask from *creeping* during the jolting operation, it is fastened down by the yoke shown in Fig. 13. The trunnion on each end of the flask occupies a space between two upright steel straps ¾ x 4 inches. These straps are bracketed and welded at the bottom and are bolted to the table of the machine. They are slotted near the top for the reception of a tapered steel key that is driven into place with a hammer. The slots in the straps are 6 inches in length and thus the key may be adjusted to hold down flasks of various heights.

Fig. 8—Cores Are Assembled and Inspected Before They Are Taken to the Setup Floors

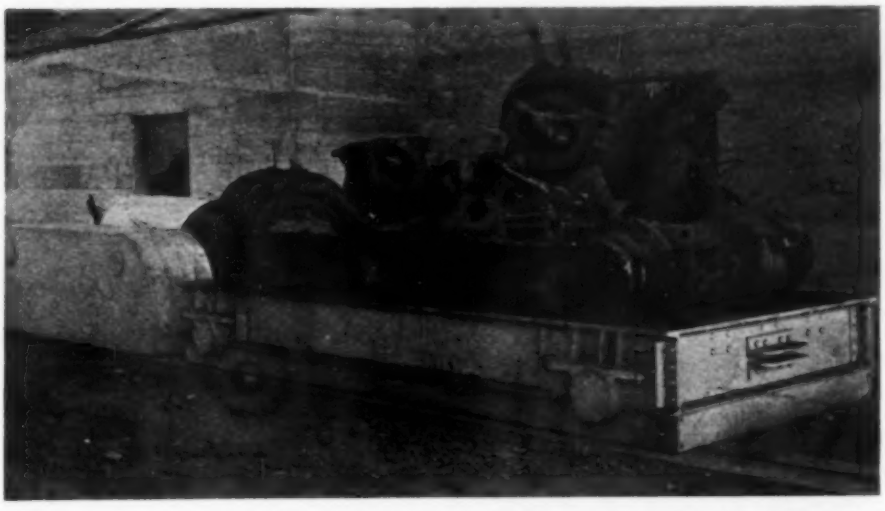


Fig. 7—The Transfer Car and Tractor Find Many Uses Besides Conveying Ladles of Metal From the Cupolas to the Various Bays

Rams the Molds

With the flask firmly fastened in place, a wood frame 6 inches in height is placed on top and filled flush with sand from a mechanical filler that lifts it from a pile in the rear and discharges it through a flexible spout which the attendant manipulates over the top of the flask. The jolting action of the molding machine draws the greater part of the upper sand layer into the cope. The wood frame is removed, the upper face of the flask is struck off flush and then the mold is rolled over and deposited on a low transfer car equipped on top with equalizer stops and rollers corresponding to the rollers on the conveyor. The machine draws the pattern, swings it vertically through an arc of 180 degrees and lowers it into place on the jolting table. The transfer car is pushed along a short

Fig. 9—Dried Cores Are Unloaded From the Oven Cars and Assembled Before the Work of Making New Cores Commences

track until the rollers come in line with the rollers on the conveyor. Here, the flask is pushed from one set of rollers to the other.

Molds steadily follow each other on this conveyor 50 feet in length. As they approach the end they are inspected by a molder who makes any necessary minor repairs and applies a coat of blackwash. They are lifted to a fleet of eight steel cars parked on the tracks in front of a battery of four mold drying ovens. Greater flexibility in loading and unloading is secured with two cars for each oven, than where the entire load is placed on a single car.

To avoid congestion, the dried molds are unloaded from the cars and rerouted on a roller conveyor located at the opposite end of the ovens. This conveyor carries them from bay No. 6 into bay No. 7 where they are picked up by the crane and carried to the pouring floor. Part of one of the pouring floors with a number of molds partly assembled, is shown in Fig. 2.

Space that is not required for the dried molds on the pouring floor is utilized for miscellaneous small green sand molds. Some of these are rammed by hand while others are made on a small rollover machine made by the Osborn Mfg. Co., Cleveland. Sand on these floors is reconditioned and piled by a sand cutting machine made by the American Foundry Equipment Co., Mishawaka, Ind.

Flywheels, bases and other castings of the same general character are poured from a good grade of gray iron in which the most important feature is that it shall machine readily. Cylinders, connections and other castings subjected in service to extremes in pressure and temperature are poured from special mixtures containing approximately 20 per cent steel.

Cylinder liners are poured from a special dense close grain metal, melted in a small air furnace which still remains in the old foundry. The molds are made in the new foundry and then taken to the old shop where they are poured. Total carbon in the metal from which these castings are poured is held between 2.85 and 2.95 per cent. The molds are made and dried vertically, and poured in the same position through a runner which extends to a gate at the bottom. The mold in each instance is considerably longer than the required casting and the extra head metal later is cut off in the lathe.

Views from opposite ends of the bay in which the cores are made, are shown in Figs. 5 and 8. The first was taken from the end section of the gallery which surrounds the small core department on three sides. The second was taken in the large core department and shows some of the typical cores in course of construction.

Method of mixing and distributing the core sand was described in a preceding article which was published in Dec. 1 issue of THE FOUNDRY on page 988. All the core sand is mixed according to five formulas known as 1, 2, 3, 4 and 5, depending on whether the sand is to be used for the ordinary small core, for the water jacket core, for brass, for skimmer cores or for the large cores.

No. 1 is made up of 10 buckets sharp sand, 1 quart dry core binder, 1½ quarts core oil, 1½ quarts molasses water and ½ pint crude oil.

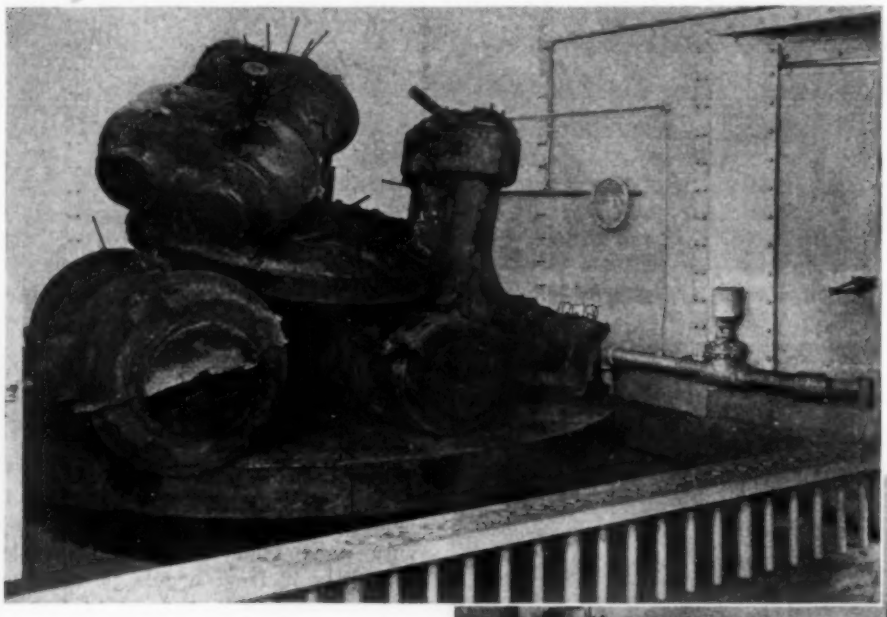
No. 2 sand for jackets contains 10 buckets sharp sand, 1¾ quarts core oil and 1½ quarts molasses water.

No. 3 sand is for brass foundry cores. The mixture is made up of 7 buckets sharp sand, 2 buckets Albany sand (screened fine), 1 quart cereal binder, 2 quarts core oil, 1 quart molasses water and ½ pint crude oil.

No. 4 mixture is for runner and skimmer cores. It is made up of 12 buckets of sharp sand and 2½ quarts core oil.

No. 5 is mixed in large quantities approximately half and half loam sand and crushed cores and bonded with a dry binder in the ratio of 1 part binder to 40 parts sand. Nearly all the castings are cored extensively and as a result a large quantity of those parts of the cores which formed the prints always are available for return to the core room where they are crushed and incorporated in the core sand mixture.

In the large core department, the coremakers unload the cars in the morning and assemble the cores. The greater number of these cores are made and dried in halves, therefore the dried halves must be matched, jointed, calipered, pasted and in some instances wired together. The finished cores are loaded on a transfer car



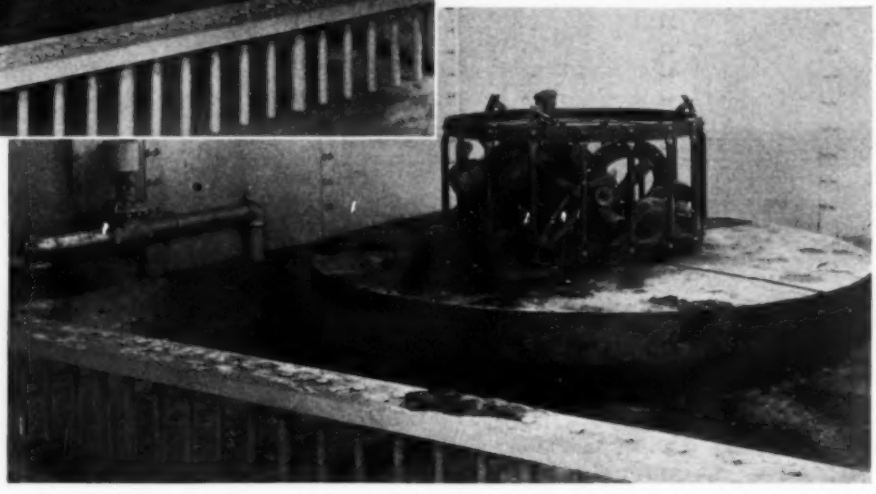


Fig. 10—(Above) Castings to Be Cleaned Are Placed on a Turntable Where Sand From the Outside and Inside is Removed With a High Pressure Stream of Water. Fig. 11—(Right) Small Castings Are Enclosed in a Steel Basket to Prevent the High Powered Stream From Washing Them From the Table

which carries them into the adjoining bay from which later they are distributed to the various points where they are required in the molds. For the remainder of the day the coremakers are engaged in making cores and placing them on the core oven cars.

The entire west bay of the foundry is set apart for cleaning the castings. Appliances and equipment for doing the work include tumbling barrels, sandblast devices, pickling tanks and a hydraulic chamber where the cores are washed out of the castings through the application of a stream of water acting under a pressure of 500 pounds per square inch. Tumbling barrels were supplied by the W. W. Sly Mfg. Co., Cleveland, sandblast equipment by the Pangborn Corp., Hagerstown, Md., and New Haven Sandblast Co., New Haven, Conn. The engineering and mechanical staff of the York Ice Machinery Corp., designed and installed the hydraulic washer. In this connection also it is interesting to note that two of the company's regular ice machines supply all the compressed air used in the foundry.

Compresses Refrigerants

An ice machine, more generally termed a refrigerating machine, is a compressor used to compress gases known as refrigerants—ammonia, carbon-dioxide, methyl chloride, etc. In the cycle the refrigerant, as gas, is compressed, then condensed to a liquid under relatively high pressure. The pressure over the liquid then is reduced to such a point that the surrounding temperature—in a butcher box, cold storage room, brine or water bath—will cause the refrigerant to boil. This boiling operation produces a lower temperature. Heat is required to boil any liquid and this heat is supplied from the surroundings. In the boiling operation, gas is produced. This gas must be removed for the operation to continue and this is done by the compressor. The gas then is compressed to the high pressure and the cycle is repeated.

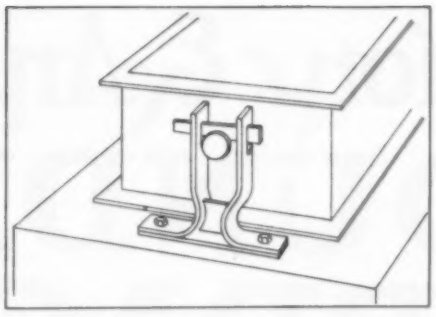


Fig. 13—Trunnion Holds the Flask on the Machine Table

A few typical castings and the manner in which they are handled in the hydraulic washer are shown in Figs. 10 and 11. The larger castings are placed directly on a revolving table where their own weight is sufficient to hold them in place under the impact of the high pressure stream of water. Smaller castings are placed in a steel basket. The basket also facilitates handling a number of castings at one lift by the crane.

Sand and water fall into a settling basin a little to one side of the cleaning chamber. The water flows away through a long pipe to a swampy area on the company's property. The sand carried in suspension is deposited here while the water drains away to an adjoining creek. The pipe is portable and is shifted from place to place as the accumulation of sand grows too high at any point. Sand in the settling basin near the hydraulic chamber is removed periodically with a grab bucket suspended from a crane. New sand in this section of the country is plentiful and cheap, therefore up to the present no attempt has been made to utilize any of this spent sand.

Patterns, wood and metal, are made in a large and well equipped pattern-shop adjoining the foundry. Practically perfect lighting conditions are secured through extensive skylights which supplement the continuous windows in the walls.

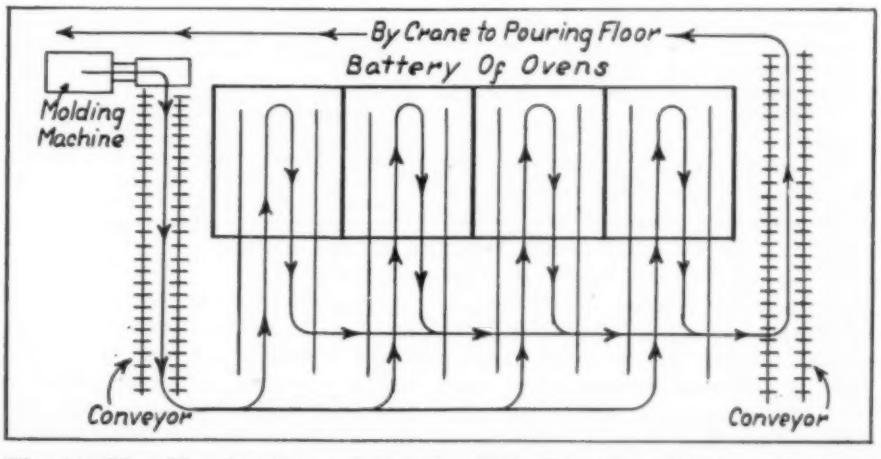


Fig. 12—Map Showing Course Taken by Molds That Are Dried in the Ovens

This is the second of two articles dealing with the recently erected foundry of the York Ice Machinery Corp., York, Pa. The first article appeared in the Dec. 1 issue of The Foundry and dealt with building construction, equipment, layout and method of handling, melting and pouring the iron.

Book Review

Tin, Its Mining, Production, Technology and Applications, by C. L. Mantell, cloth, 366 pages, 6 x 9 inches, published by the Chemical Catalog Co. Inc., New York, and supplied by THE FOUNDRY, Cleveland, for $7 plus 15 cents postage, or in London by the Penton Publishing Co. Ltd., 416-17 Caxton House, Westminster, for 35s, postage extra.

This volume, which is one of a series of monographs arranged under the auspices of the American Chemical society, is a carefully compiled treatise of authoritative, available information on the subject of tin. The subject is covered in a comprehensive manner and deals with the history, physical and chemical properties, production, distribution, application, and consumption of tin. Chapter 1 is devoted to the history of tin. Chapter 2 describes the physical and chemical properties of the metal, and chapter 3 relates to the production, distribution and consumption. Chapters 4, 5 and 6 cover tin ores and ore deposits, mining and ore dressing, and smelting and metallurgy respectively. Gaseous reduction and electrolytic refining are described in chapters 7 and 8 while chapters 9 and 10 are devoted to plating and alloys of tin. Hot-dipped coatings is the subject of chapter 11 and data on foil and collapsible tubes are given in chapter 12. Compounds of tin and corrosion respectively are covered in chapters 13 and 14 while corrosion of tin plate by food products, and secondary tin are topics of chapters 15 and 16. Detinning of tin plate scrap is described in chapter 17 and the volume closes with chapter 18 on analytical methods.

Issue 1929 Index

Recently the American Society for Testing Materials issued a combined index to all of its standards and tentative standards in effect on Sept. 3, 1929. The index lists 390 standards and 173 tentative standards that appear in its 1929 *Year Book*, and in the 1929 *Supplement* to the *A S.T.M. Standards*. It also gives a price list of the society's various publications.

Questions & Answers on FOUNDRY PRACTICE

GENERAL

Increases Production

QUESTION

From an outside source one of the officers of our company learned that there is a new method of making molds by which a molder's output is increased 50 per cent. He did not learn all the details but gathered in a general way that this highly desirable result was gained by stacking the molds. Naturally, when the proposition was put to me I admitted that a 50 per cent saving in floor space might be effected by stacking the molds, but so far as output is concerned, a man will make the same number of molds for a day's work whether he spreads them on the floor or stacks them several tiers deep.

ANSWER

You are quite right in your contention that simply stacking the molds will not increase production. If the molds are made in the ordinary manner, their construction will occupy the same time whether they are stacked or spread on the floor. The only exception to this rule is a mold in which the joint face is perfectly flat. In this case stacking the molds will reduce the molding time since the one body of sand serves for a drag of one mold and for a cope for the mold underneath.

However, the method to which the officer of your company probably referred is that sponsored by several molding machine manufacturers both here and in Europe and examples of which have been described many times in THE FOUNDRY. Briefly, a double faced pattern plate is provided and a cope and drag impression of the mold are formed each time the squeezing head is brought down or up, depending on the type of machine. We suggest you write the various molding machine makers whose addresses you will find in the advertising section of THE FOUNDRY. The manufacturers of machines constantly are improving their product, and if you have not made an intensive study of the different models recently, you will be surprised at the many refinements incorporated in machines designed primarily to increase production, not necessarily by stacking the molds, but by placing the molds on conveyors or on the floor in the ordinary manner.

THIS department covers all problems relating to metallurgical, melting and molding practice encountered in making steel, malleable-iron and gray-iron castings. Questions submitted by bonafide subscribers to this department will be answered by members of the editorial staff of The Foundry, supplemented where occasion requires by the advisory staff whose personnel is as follows:

John H. Hall—Cast Steel
H. A. Schwartz—Malleable Cast Iron
J. W. Bolton—Gray Cast Iron

All questions should be addressed to The Editor, The Foundry, Penton Building, Cleveland.

Q & A

Make Ingot Mold Stools

QUESTION

We are contemplating making ingot mold stool castings from a pattern about 3 feet square, 9 inches thick and will appreciate any information you can give us on the methods employed in molding these castings.

ANSWER

On account of their weight and bulk the sand in which these castings are molded must be rammed fairly hard and therefore one of the main requisites is that it shall be porous. The large body of molten metal has a tendency to fuse the face of the mold and to prevent this as much as possible it becomes necessary to provide a sand with a high silica content. Sand from several deposits in your vicinity is available and suitable for the purpose and if you are in doubt which to select, the sand producers will be glad to take up with you the qualities of their product.

The castings are made in green sand molds in iron flasks and the actual method employed will vary to some extent depending on the proposed daily output and on the available equipment. In many foundries the molds are rammed by hand, in others the sand is rammed with pneumatic rammers and in a few places the molds are rammed on jolt machines. The drags are rolled over, but the copes merely are lifted from the machine and placed on the drags. Several methods of gating the casting are practiced. In one the metal is dropped through a single runner into one of the four corner feet. In a second method the iron is poured through several small pop gates on to a flat core on the face of the mold. In a third instance a gate core with a suitable opening is rammed up with the pattern in the drag. The iron enters the mold near the bottom face through this core. A thick coating of black lead or talc is shaken through a bag on to the face of the mold to produce a smooth skin, but the remainder of the mold is not treated.

Q & A

Tuyere Ratio Is Small

QUESTION

Some writers on cupola practice claim that the combined tuyere area should amount to approximately one-ninth of the cross sectional area of the cupola at the melting zone. What is your opinion on this point?

ANSWER

One-ninth may be regarded almost as the minimum proportion under which a cupola will operate. Also, a cupola equipped with such small inlets will melt slowly and will choke in a short time. The one-ninth theory is based on what may

be described as old time practice when comparatively short heats were the rule rather than the exception. Certain works published on cupola practice 30 years ago solemnly include tables showing the melting capacity of cupolas, not the melting capacity per *hour*, but the *total* melting capacity. Modern cupola practice favors a much more liberal tuyere area. In shops where the cupola is in continuous operation all day, also in other shops where the bottom drops clean and only a trace of a ring is found above the tuyere line after a 2 or 3 hour heat, the tuyere area usually is equal to one-fourth and in some cases, one-third of the cross sectional area of the cupola at the melting zone.

GRAY IRON

Blowholes in Dies

QUESTION

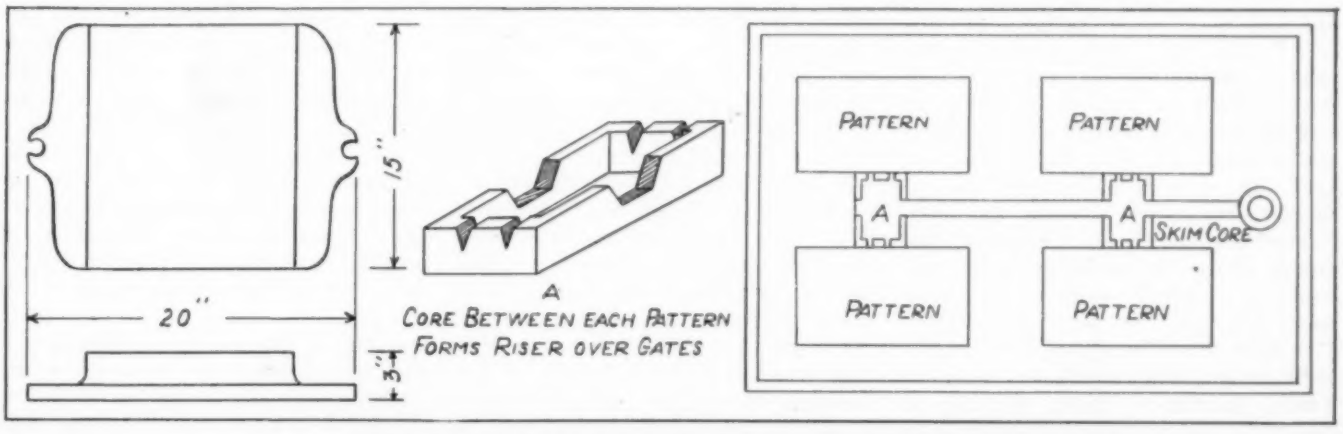
We are operating a cupola lined to 66 inches with 6 tuyeres, 7 x 10½ inches, 20 inches above the bottom. The coke bed is 26 inches above the tuyeres and we operate under 14 ounces pressure with a volume of 420,000 cubic feet of air per hour. We are having considerable difficulty with gas or blow holes. Until recently we have been making some 2000 pound castings to withstand steam pressure with a composition containing 1.30 to 1.40 per cent silicon; 0.70 to 0.80 per cent manganese; phosphorus, 0.18 to 0.20 per cent, and sulphur 0.08 per cent without difficulty. We also are making die blocks with iron analyzing 1.50 to 1.60 per cent silicon; 0.70 to 0.80 per cent manganese; 0.18 to 0.20 per cent phosphorus, and sulphur under 0.09 per cent. These die blocks run in size from 6 inches square and 1 inch thick to 24 inches square and 3 inches thick. The larger ones give the greatest trouble from holes. The method of molding the larger blocks is shown in the accompanying sketch.

ANSWER

Holes in castings usually come from one of three causes. In cases where design is not proper, unequal sections are encountered, which may cause shrinkage. Molding practice may not provide for sufficient feeding to prevent holes. If the metal is too cold or has unusual contraction, shrinkage cavities are likely to occur. These also are known as drawholes. They are distinguished by their jagged appearance, as differentiated from the rounded form and shiny interior of the usual blowhole. In the present instance the design of the casting makes it unlikely that the trouble is shrinkage or drawholes.

Scabs are places where sand or parts of core are washed away. Metal runs into these pockets, forming scabs on the casting. However, wherever the sand or piece of core stops there will be a hole. Sometimes these holes resemble ordinary blowholes quite closely, but can be distinguished because of the scab, which latter usually is on the drag side. While scabbing can arise from other causes, too wet and too hard molds (or cores) scab readily. Also, the excess of moisture causes steam and gases which will cause blowholes—particularly so because a wet hard mold is not free venting, hence the gases are trapped in the metal.

Regular blowholes are rounded and usually found on the cope side. They result from gases trapped in the metal. Although under certain conditions the metal itself may give off gases, moisture from the sand or use of certain binders is a far more likely cause. The primary cause of these gases is helped by working the sand on the dry side. However some gases are generated in every mold and it is well to see that these can escape readily. This can be accomplished in two ways, both of which should be taken advantage of. These are proper venting of the sand and the use of good hot metal. An open sand is self-venting. In some cases use of the vent wire is desirable. Also a small riser or popup on the top of the casting allows the mold to fill with no back pressure. Castings poured with dull or cold iron often contain blowholes. Such metal sets or freezes quickly and any bubbles of gas in it are trapped, forming blowholes. Quite often these are found just under the skin on the cope side. Cold iron is traceable to improper cupola practice or in some cases to slow handling. In the present instance 420,000 cubic feet per hour seems too high for the cupola; 360,000 cubic feet per hour is probably better for production of good hot iron. The cupola will melt slightly faster with the higher air input, but in the ordinary cupola and many grades of coke maximum temperature is not likely. The first thing suggested is actual measurement of the temperature of the iron at the cupola spout by means of an optical pyrometer. The metal should run 2700 degrees Fahr. If not, lower air should be tried as indicated above. Some cokes will take the larger volume of air and if temperature is maintained there certainly is no objection. If temperature is low it just means that excess air is being heated up and heat wasted. A 26-inch bed is rather low for the higher volume of air, as the greater volume raises the melting zone. The proper height of bed depends on the particular shop practice. The height of cupola bed as charged is not the height maintained throughout the heat. If, after the bed is in, the tuyere cleanout doors are left open and the cupola not choked down by getting the charges in quickly, the bed will burn considerably before the wind is put on. On the other hand if the charges of coke between iron charges are unduly large the bed will build up. Unless large percentages of steel are used, a 10 to 1 ratio, 10 pounds of iron to 1 pound of good coke between charges is sufficient. Too much coke is a common cause of dull iron. More coke does not make hotter iron. The present cupola should operate nicely on 3000 pound charges. Do *not* use a double first charge. If this latter



SKETCH SHOWING METHOD OFMOLDING LARGE DIE BLOCKS

practice is followed the 26-inch bed in actuality becomes about a 22-inch bed.

In the die castings illustrated it seems that the die faces are on the cope side. This is peculiar practice, the faces should be on the drag side. The drag side is always cleaner. It is doubtful if the riser shown does any feeding of the casting.

In problems of this type a half hour in the foundry is worth more than any long distance analysis. The services of a skilled consulting metallurgist would prove an economy, as he would determine quickly just how to apply the principles outlined above, and which pertain most to the problem.

Q & A

Kettle Withstands Heat

QUESTION

What is the most desirable mixture and analysis of cast iron for acid-resisting soap kettles. The kettles also are supposed to withstand high temperature as heat is applied to boil the contents. These castings weigh 5 tons, are 10 feet in diameter and 3 feet deep. The metal thickness is approximately 3 inches.

ANSWER

Due to he shallowness and weight of the soap kettles you refer to, they must be made of a strong, tough iron to withstand strains. The acid resisting and high temperature features necessitate a low silicon mixture and also low sulphur and phosphorous. Years ago this was accomplished by using about 50 per cent charcoal iron and the remainder of scrap charcoal iron car wheels.

However, any good brand of iron of low silicon, sulphur and phosphorus content may be used. We would suggest the following analysis for the finished casting: Silicon, 0.70 to 1.00 per cent; sulphur, as low as possible; manganese, 0.60 to 1.00 per cent; phosphorus, under 0.30 per cent, and total carbon, 2.75 to 3.00 per cent.

Steel may be added to assist in maintaining the low carbon and silicon. The scrap iron used in the charge should be selected carefully with a view to holding the sulphur and phosphorous as low as possible.

Chromium, added as ferrochromium, is being alloyed with cast iron to promote resistance to acids and heat. Ferrochromium may be added to the cupola charge by enclosing it in steel containers which prevent oxidation until the melting zone is reached. The alloy may be placed also in the ladle, unless large quantities are used. Large quantities cause chilling of the metal unless the iron is smoking hot. If you desire to use ferrochromium, say about 0.5 to 1.0 per cent in the mixture, we suggest that you increase the silicon to 1.50 per cent as the chromium increases the hardness. Nickel in the proportion of 3 nickel to 1 chromium will decrease the tendency to hard machining, and will give strong, dense castings.

Q & A

Cast Iron Resists Heat

QUESTION

We have made some tuyeres for stokers that only last 4 months while they are expected to last 6 months. These have to withstand a great degree of heat and we would like to obtain some information on a good analysis for this purpose.

ANSWER

You do not state what analysis you now are using, but imagine that perhaps the silicon is higher than necessary. For stoker tuyeres we suggest that you use a low silicon mixture which will give a white or nearly white fracture. If the tuyeres are used as cast, and are not subject to shock, the fracture may be all white. If it is necessary to machine them, or if they are subject to shock, the fracture should be to the gray side. However, keep the silicon as low as is consistent with the purpose in view.

If the sections are thin, the silicon will have to be higher than with heavier sections. A cast iron for heat resistant purposes will contain from 1.25 to 2.50 per cent silicon; sulphur, as low as possible; phosphorus, under 0.20 per cent, and manganese, 0.60 to 1.0 per cent.

Q & A

Silicon Lost in Melting

QUESTION

Will you kindly tell us the exact percentage of silicon we may anticipate in a casting poured from a mixture of pig and scrap containing 2.20 per cent silicon.

ANSWER

The percentage of silicon lost during the melting process varies to some extent under different circumstances, but usually lies between a maximum of 0.25 and a minimum of 0.20 per cent. Thus in your case you may anticipate a silicon content anywhere between 2.05 and 2.10 per cent. Even when melting all pig iron where the silicon content is definitely known the resulting metal may show a variation of 5 points or more on succeeding days, due to difference in blast pressure and volume, height of bed, thickness of charges and other factors in the melting problem that are not absolutely uniform from day to day. Where scrap is employed to form part of the charge, the silicon content in the resulting castings cannot be predetermined definitely. The best that can be done is simply an approximation, based on the known silicon content in the pig iron and the probable content in the scrap.

In a general way it may be stated that less silicon is lost where a mild blast is employed, than where it is customary to carry a high blast pressure with accompanying volume. Where this latter feature is carried to extremes the result approaches the preliminary stage observed in a bessemer converter where a stream of air blown through the molten metal burns *all* the silicon out in a few minutes.

STEEL

Melting and Refining

QUESTION

Can you give us any information on the melting and refining of stainless iron and steel, and nickel-chromium alloys in the electric furnace? Which is better, the acid or basic method? What percentage of chromium is lost on both methods? Is there any chromium pick-up on succeeding heats and the amount? What, if any, deoxidizers are used, and their amounts?

ANSWER

The basic furnace generally is used for the production of the alloys, on account of the losses of chromium into the slag and the difficulty of handling the slag produced in the acid furnace. In one instance where the acid process was employed, the loss of chromium amounted to three or four per cent in a ten per cent chromium metal, which involved an almost prohibitive extra cost for the alloy. In the basic process the loss of chromium should not be over some two per cent in an eighteen per cent metal.

Considerable difficulty is experienced in remelting the scrap, and in some shops no attempt is made to remelt it, when low carbon alloys are being produced. The difficulty is that if an oxidizing atmosphere is maintained, the chromium is oxidized and the oxide absorbed by the steel is difficult, if not impossible to remove by any deoxidizers whatever. The oxide has a harmful effect on the physical properties of the metal, lowering both the strength and the toughness. On the other hand, if the furnace is run reducing, the pick-up of carbon in remelting is so rapid as to carry the carbon content of the bath above the permissible limits. About three-fourths of the contained chromium of the scrap should be recovered on remelting.

The deoxidizers used are the same as in regular basic furnace practice.

Problems in Nonferrous Founding

By Charles Vickers

Mold Is Crushed

We are having trouble with the buckling of sand around the edges of the raised portion of a cast aluminum plate on the drag side only. It appears that when the metal is solidifying, the over-all shrinkage of the plate buckles the sand or upheaves it to such an extent to make the plate thin around the outer portion of the raised section. We have used powdered rosin around these edges, and skin dried the entire surface of both cope and drag before casting. We have had this trouble since adding a small portion of new Albany No. 1, *sand to the piles. This is the same grade of molding sand we have always used. Can you suggest the cause of this trouble?*

As far as we understand this situation it appears that this buckling of the sand is merely an exhibition of the effect of the natural shrinkage of the aluminum and is in no way connected with the thinning of the outer edges of the plates. The casting shrinks and thus gets smaller and in doing this it has to crush the sand of the mold where opposition to the contraction is offered, otherwise the casting would crack.

Therefore, we are inclined to think the difficulty is caused by *squeezing down* the cope while the mold is being clamped or weighted. The effect of this is sometimes to *crush-off* the thickness of a thin plate. In the case of name plates, especially when they are long, the molder has to be careful in finishing off the top of his cope to avoid sagging it when doing the weighing for as little as an ⅛-inch sag shuts off most of the thickness of the plate.

The only safe way to make a name plate of considerable size is to bed a stout, smooth bottom or follow board on top of the cope. Be careful to see that this board has a bearing on all sides of the flask to carry the weight, and a gentle contact with the sand of the cope, to prevent *pushing-up* the cope. We suggest that a flask be used for this plate that fits perfectly at the juncture of cope and drag. There must be no rocking, so that when the mold is made and closed there will be no down-pressing of the cope under the clamping. If weights are used, be particular to see that their weight is not carried by the sand of the cope. The weight must be carried by the flask, and there should be merely a bearing on the sand, otherwise there will be a crush. A crush can never occur after the metal is poured and set. Whatever defects were in the mold are perpetuated in the metal. A crush or a buckle must take place before the metal is poured, or if poured, before it sets. In a thin casting the metal sets almost instantly so it cannot be squeezed thinner, *after it is in the mold.*

Q & A

Recovering Metal Dross

We are sending for your observation a sample of metal recovered from brass dross, by grinding in a ball mill, then screening to remove the fine non-metallics. We want to know the best way of melting this down with the least metal loss. Would you recommend running down a heel and working this recovered metal in, or would it be better to melt under borax, or some other salt. If the latter, what salt would you recommend?

We feel that working this recovered metal into a previously melted heel would be a tiresome business. The better way would be to use the horizontal cylindrical noncrucible furnace with oil fuel and charge in the recovered metal with a flux of common glass to which is added a little soda ash to increase liquidity. When the bath is molten skim off the slag and charge more scrap and flux and continue until the furnace is full of metal when it has to be poured. It is necessary to work at a high temperature, and to get a fluid slag, to which end soda ash is added when necessary.

If crucibles must be used, choose those that have lived a useful life but still look good for another heat, fill them up with the recovered metal which has previously been mixed with a flux of 10 parts sand to 30 parts soda ash, the amount of flux to use to be gaged by the fluidity of the slag, for if the latter is stiff it will entrap metal. The flux will attack the crucible and that is the reason for using crucibles that have seen service, as they may not last more than one heat. The heats must be made hot, and if the pot is good for further heats, it should be pulled when ready, then skimmed and the metal poured. Add sand to the slag if it is too thin to skim.

The skimmings and also the screenings which removed the nonmetallics will carry a considerable amount of metal, but it is doubtful if anything can be done with this material without a blast furnace. While it can be sold to smelters, sometimes it is a question whether or not, the sum realized is worth the trouble of saving and shipping such material.

Q & A

Alloys Are Different

We have been using carbon-free manganese to deoxidize our copper in making high grade bronze to stand 4000 *pounds pressure. Our last shipment, however has the following analysis;* 97.30 *per cent magnesium;* 1.20 *iron;* 0.58 *per cent lithium, and* 0.08 *per cent carbon. We use about one ounce of manganese to each hundred pounds of copper, but the analysis of the last shipment is so different we hesitate to use it.*

A mistake has evidently been made and magnesium has been sent instead of manganese. While magnesium is also used to deoxidize copper, we are skeptical as to whether it would confer the same properties on the bronze as manganese. We advise against its use in this connection for it is not the element that was ordered. The deoxidizing value of magnesium is of course greater than that of manganese, as it possesses a higher heat of oxide formation, but in this case deoxidization of the copper may not be so important as ductility of the film binding the crystals. The situation may be analagous to that existing in the case of nickel-iron alloys, in which magnesium has no effect in making them forgeable, while manganese in certain proportion, depending on the nickel content, produces perfectly forgeable metal.

Tests Refractoriness of Molding Sands

By J. F. McMahon

DEGREE of refractoriness of a material generally is defined as a measure of the ability of that material to withstand heat. However, since the conditions under which the heat is applied have a marked effect upon the temperature at which certain heat reactions take place, it is necessary to consider the prevailing conditions in service, when studying the refractoriness of a material. More specifically, refractoriness has come to mean the ability of a material to withstand heat under definite conditions, such as atmosphere which may be oxidizing, neutral or reducing; action of acid, neutral or basic slags; sudden or gradual application of heat; and heavy or light loading.

Must Consider Changes

In linking up refractories with a material for a specific type of service, the conditions under which the heat is applied and the characteristic change of state evidencing failure for that service must be recognized.

A molding sand made up into a desired shape stands on the foundry floor at a temperature perhaps a little above that of the atmosphere. Molten metal there is poured into the sand, the temperature of which varies up to 1670 degrees Cent. The conditions which prevail at the point of contact of the sand and molten metals are: Highly reducing atmosphere; slight slag action; sudden heat application; imposed load varies from pounds to tons per square foot; and temperature may be as high as 1670 degrees Cent.

Therefore, it may be stated that the refractoriness of a molding sand is the degree to which that sand will withstand heat with the prevailing conditions of reduction, thermal shock, and an imposed load, without and detrimental chemical or physical changes The characteristic detrimental change may be regarded as that which causes the sand to fuse to the casting.

Mineral and chemical constituents of the sand are of primary importance in that the reactions that take place in the sand upon the application of heat depend upon those factors.

Table II taken from an article by P. G. H. Boswell entitled, "Molding Sands for Nonferrous Foundry Work," lists 31 molding sands which he gives as being in use in the industry. These show the wide range of chemical composition.

Consists of Two Parts

Molding sand consists of two component parts, granular material and clay substance. Granular material is made up principally of quartz grains which are extremely refractory. Mingled with the quartz grains may be many minerals, the most common of which are feldspar, magnetite, garnet, mica, and calcite. They represent that part of the granular material which, due to ease of fusibility, ease of reduction, or fluxing action, fail first under heat. However, their effect upon the quartz grains usually is slight because of the small amounts present and the restricted surface contact. In a sand the granular portion usually is the more refractory part.

Clay substance of a sand is the weak factor in the refractoriness be-

Describes Tests

LITTLE work in the past has been devoted to the determination of the refractoriness of molding sand and to devising a satisfactory test for that property. This article, which is abstracted from a paper presented at the Chicago convention of the American Foundrymen's association, outlines the effect of heat on molding sands and explains the way the different constituents react. Some of the findings of other investigators also are given. The majority of the article is devoted to a description of the various tests used in determining the refractoriness of molding sands and the interpretation of the results of the tests. The author is ceramic engineer, mines branch, department of mines, Ottawa, Canada.

Table I

Screen Analyses of Molding Sands Tested

Sand	On 6	On 10	On 20	On 35	On 65	On 100	On 150	On 200	On 270	Pan	Clay Substance
1	.....	.....	0.14	3.72	27.36	17.28	15.14	7.98	4.90	9.80	13.68
2	.....	.....	2.14	8.64	21.30	14.32	12.94	7.24	3.44	9.04	20.94
3	.....	0.28	2.10	10.02	27.50	18.24	15.94	6.88	4.82	2.30	11.92
4	.....	.....	0.10	43.25	35.36	7.05	6.82	3.53	1.74	0.85	.....
5	.....	.....	1.40	38.68	48.76	7.90	2.64	0.29	0.03	0.05	.....
6	.....	0.22	0.22	0.36	0.58	3.06	15.84	16.60	11.62	32.42	19.08
7	.....	1.24	19.24	62.65	14.50	1.14	0.40	0.13	0.05	0.05	.....
8	.....	.....	13.05	68.96	15.78	1.22	0.50	0.15	.....	.....	.....
9	.....	0.30	6.92	56.18	15.36	2.16	0.58	0.18	0.12	0.32	17.88
10	.....	.....	0.20	3.00	15.68	24.96	30.82	4.82	1.48	2.48	16.56
11	4.96	17.20	39.36	66.12	74.46	75.52	76.14	76.42	76.66	77.88	22.12
12	.....	2.08	6.26	20.50	18.88	11.74	6.10	2.88	1.98	10.46	19.12
13	.....	.....	0.12	0.32	0.56	6.06	22.76	21.32	14.72	24.74	9.40
14	.....	.....	1.45	14.30	67.87	13.16	2.55	0.45	0.15	0.07	.....
15	.....	0.04	0.12	1.44	11.68	11.56	14.72	7.92	5.14	17.76	29.62
16	.....	.....	0.02	0.05	4.61	6.46	5.87	4.49	6.46	13.88	16.32
17	.....	7.54	19.14	24.74	16.36	4.74	0.46	0.30	0.28	3.42	23.02

cause it usually carries with it most of the fluxing elements in a finely divided and intimately mixed state. The more important item in this consideration is the refractoriness or quality of the clay substance.

Fineness of grain affects the refractoriness of a material inasmuch as upon it depends the surface contact and hence the ease of chemical reaction.

Although the property of refractoriness is of decided importance, in view of the high temperatures to which molding sands are subjected, little investigational work has been done in the past and no standard method of determining it has been adopted.

Values Chemical Analysis

In various sections of an article, by Curtis entitled, "Steel Molding Sands and Their Behavior Under High Temperatures," the following may be found:

"It might be stated that, in the author's opinion, the value of the ultimate chemical analysis cannot be overestimated for checking the stability of either molding sand composition, natural argillaceous steel molding sands, artificial steel molding sands, or proprietary mixtures, together with clays and silica sands which often form the basis of artificial facing mixtures.

"A survey of the analyses of commercial clays having high refractory qualities will seldom find a material classified as a clay with an alumina content of less than 10 per cent.

"The uniformity of grain will confer high permeability and high refractoriness.

"The presence of carbonaceous matter tends to reduce the fusion. The flux content should not be over 4.84 per cent."

Curtis also makes comparison of results of fusion with chemical analysis throughout, and considers the flux content the controlling factor of same. P. G. H. Boswell in his article, "Moulding Sands for Nonferrous Foundry Work," says that "ferrous compounds tend to fuse rather readily, but certain ferric compounds, particularly the oxides, are highly refractory, if the conditions are *oxidizing and not reducing*, as is the case in molding sand practice. As an example, it may be mentioned that the bond of the most successful steel molding sand is largely hydrated ferric oxide."

Feldspar is undesirable for high temperature work, due to low fusion, and desirable in low temperature work, due to bonding powers.

Boswell states further:

Good steel molding sands should not have alkali content over 1.00 per cent. It is best to have 0.5 to 0.7 total alkali.

Lime and magnesia should amount only to 0.5 per cent to 0.6 per cent with magnesia on the greater end.

Few carbonates are present. Lime is probably combined with soda and alumina or silica. The percentages sometimes found were exactly the amount needed for labradorite.

Magnesia probably with mica.

Titanium increases in the clay grade. It form 5 per cent of clay substance.

Six to seven per cent Fe_2O_3 causes fluxing action and formation of silicates of iron.

Best sands carry over 2 per cent and sometimes as high as 5 per cent iron oxide.

R. Moldenke, *Mechanical World*, Vol. LVI, p.248, says: "A good sand should resist high temperatures and be friable after use as a mold, be of such a texture that the surface of the casting is small and free from blemishes. A low percentage of feldspars is desirable owing to their fusibility."

While the specific refractoriness, that is, the temperature at which the sand would fail under foundry conditions, could be determined by preparing molds of the sand and pouring into them molten metal at increasingly higher temperatures until that at which the sand would sinter to the surface of the casting was reached, it would be an expensive procedure and practically impossible to perform on a small scale under correct conditions in a laboratory.

The methods that suggested themselves do not measure the specific refractoriness of the sands, since they do not reproduce the service conditions in every respect, but they have been tried in the Canadian mines branch laboratories on a series of seventeen samples of commercial foundry sands to learn whether they might be useful in determining the relative re-

Table II

Analyses of Molding Sands

Substance	Per Cent	Comments
SiO_2	95.86 to 46.67	Extremely refractory and stable. Mostly in the form of quartz. Some in clay, feldspar and mica.
Al_2O_3	24.81 to 2.03	In clay and feldspar. Very refractory in itself.
Fe_2O_3	5.47 to 0.13	Found coating the grains of quartz. In the clay and concretionary. Refractory in itself. Easily reduced.
FeO	0.56 to 0.15	Found in various minerals. Not refractory. Fluxes easily with silica and alumina.
MgO	1.78 to 0.16	Found mostly in mica and in clay substance. Refractory in itself but undesirable due to its basic properties.
CaO	4.55 to 0.14	Found as carbonate and in feldspar and clay. Refractory in itself but an active flux when heated with SiO_2 and Al_2O_3.
Na_2O	1.50 to 0.06	Found in clay. Flux, not refractory.
K_2O	5.45 to 0.50	Found in clay but mostly in feldspars. Active flux, not refractory.
Ign. Loss	12.29 to 0.47	Carbon dioxide. Carbonaceous matter, aids in reduction.
H_2O	3.18 to 0.56	Not important as far as refractoriness is concerned.
H_2O	2.11 to 0.28	
CO_2	3.52 to None	Found in magnesium and calcium carbonates. Has no effect upon refractoriness.
TiO_2	0.97 to 0.06	Found in clay matter and ilmenite. Negligible.
ZrO_2	Trace to None	
P_2O_5	0.15 to None	
SO_3	0.42 to None	
Cl_2	0.03 to None	Unimportant as far as refractoriness is concerned.
MnO_2	0.06 to Trace	
BaO	0.04 to None	

Table III

Data on Molding Sand Tests

Sand No.	Beginning Bond Shrinkage, Deg. Cent.	Bond Vitrified, Deg. Cent.	Tendency to Distort, Sag Test, Deg. Cent.	Strong Matrix, Crushing Test, Deg. Cent.	Softening Point of Bond, Cone Test, Deg. Cent.	Softening Point of Sand, Cone Test, Deg. Cent.	Failure Saeger's Tests, Deg. Cent.
1	1010	1050	1167	1210	1330	1420	1503
2	1010	1050	1417	1210	1150	1450	1478
3	Below 1010	1010	1150	1250	1099	1480	1380
4			Too Fragile			1713	
5			Too Fragile			1705	
6	1010	1050	1320	1210	1330	1410	1410
7			Too Fragile			1730	
8			Too Fragile			1705	
9	1050	1350	1420+	1470+	1635	1600	1428
10	1050	1250	1420+	1410	1410	1600	1482
11	1010	1310	1420+	1470+	1620	1600	1474
12	1010	1110	1130	1250	1450	1430	1385
13	1010	1050	1205	1210	1290	1530	1328
14			Too Fragile			1740	
15	1010	1110	1215	1250	1330	1430	1488
16	1010	1050	1220	1210	1099	1470	1410
17	1050	1150	1250	1250	1310	1420	1390

Table IV

Refractoriness by Saeger's Method

Trial	Temperature Degrees Cent.	Remarks	Trial	Temperature Degrees Cent.	Remarks
		Sand No. 1			
1	975	No glass	6	1217	No glass
2	1055	No glass	7	1242	No glass
3	1097	No glass	8	1291	No glass
4	1118	No glass	9	1365	Traces of glass
5	1187	No glass	10	1503	Stuck to strip
		Sand No. 2			
1	975	No glass	6	1210	No glass
2	1035	No glass	7	1223	No glass
3	1058	No glass	8	1258	No glass
4	1118	No glass	9	1375	Traces of glass
5	1173	No glass	10	1478	Stuck
		Sand No. 3			
1	975	No glass	6	1223	First sign of glass
2	1055	No glass	7	1250	Glass
3	1072	No glass	8	1288	Glass
4	1118	No glass	9	1380	Stuck
5	1167	No glass			
		Sand No. 6			
1	1062	No glass	5	1288	First signs of glass
2	1097	No glass	6	1268	Glass
3	1158	No glass	7	1300	Glass
4	1158	No glass	8	1410	Stuck
		Sand No. 9			
1	1035	No glass	6	1215	No glass
2	1035	No glass	7	1340	No glass
3	1104	No glass	8	1458	Traces of glass
4	1143	No glass	9	1433	Traces of glass
5	1173	No glass	10	1428	Traces of glass Fusion started
		Sand No. 10			
1	1035	No glass	5	1173	No glass
2	1035	No glass	6	1230	No glass
3	1118	No glass	7	1360	No glass
4	1097	No glass	8	1482	Stuck
		Sand No. 11			
1	960	No glass	5	1202	No glass
2	1055	No glass	6	1198	No glass
3	1143	No glass	7	1345	No glass
4	1135	No glass	8	1474	Much glass
		Sand No. 12			
1	1020	No glass	5	1210	No glass
2	1010	No glass	6	1237	No glass
3	1097	No glass	7	1261	No glass
4	1150	No glass	8	1385	Stuck
		Sand No. 13			
1	1097	No glass	5	1223	Slightly stuck
2	1104	No glass	6	1275	Slightly stuck
3	1143	No glass	7	1328	Stuck badly
4	1173	No glass			
		Sand No. 15			
1	983	No glass	6	1213	No glass
2	1055	No glass	7	1261	No glass
3	1104	No glass	8	1385	Traces of glass
4	1104	No glass	9	1488	Much glass
5	1173	No glass			
		Sand No. 16			
1	1045	No glass	5	1190	No glass
2	1080	No glass	6	1250	Traces of glass
3	1158	No glass	7	1300	Traces of glass
4	1158	No glass	8	1410	Stuck
		Sand No. 17			
1	975	No glass	5	1158	No glass
2	1045	No glass	6	1205	No glass
3	1088	No glass	7	1250	No glass
4	1135	No glass	8	1390	Slightly stuck

fractoriness of such sands. These tests are as follows: Softening point determination of entire sand; softening point determination of clay substance; sag test; draw trial; Saeger's local application of heat tests; fineness.

Softening point determination of the entire sand was chosen because of its general use in the testing of refractoriness of materials which are similar to molding sands. This test is in use daily in the ceramic industry for the testing of the refractoriness of the clays, etc., which are used in that industry. The procedure is as follows: The material was quartered to a 200-gram sample. This sample then was ground in an agate mortar to pass a 60-mesh screen. The material was moistened sufficiently to allow it to be made into "cones" similar to standard pyrometric cones, 7 millimeters along the edges of the base and 30 millimeters high. They were molded by hand in a steel mold. In the case of nonbonded sands sufficient gum tragacanth was added to furnish the necessary bond.

When the cones were dry, they were embedded in a plaque of alundum to the depth of 2 millimeters alternately about the periphery of the plaque with standard cones of successive numbers. The angle between the face of the cone and the plaque was approximately 75 degrees. The standard cones used were those of the Seger formulae.

The furnace was a carbon-resistance furnace which was capable of temperatures up to 1800 degrees Cent. Strong reducing conditions were present. The temperature was raised to 1000 degrees Cent. in one hour, and thereafter at the rate of 60 degrees per hour. The softening point taken was that point at which the sand cone tipped and touched the plaque. The results of the test are given in Table III.

Gives Heat Resistance Qualities

The above test is one which gives the ultimate heat-resisting qualities of the material. Undoubtedly its use would be of value in determining the refractoriness of a molding sand. However, its results represent reactions which have gone to completion rather than the beginning of such reactions. The desired factor in molding sands is the beginning of failure rather than complete failure.

Considerable stress has been laid upon the importance of the clay bond in the determination of the refractoriness of a molding sand. To ascertain the degree to which the component of the sand affected its refractoriness the following experiments were run.

The clays were washed free from the sand grains by the method suggested in the fineness tests of the American Foundrymen's association tentatively adopted methods of test. The only deviation from this standard was the use of ammonium hydroxide in place of the sodium hydroxide as specified. This was done to avoid any fluxing action which the sodium would impart to the clay.

The clay bonds were made into cones and tested in a similar manner to the entire sands.

The results obtained by this test were those given in Table III.

This test was carried on to determine at what temperature bending would take place in a bar of molding sand, 4 x 1 x ½ inches, when resting on the flat upon two supports 3 inches apart. The sand was quartered down to a 500-gram sample. It then was passed through a 16-mesh screen and tempered with sufficient water to allow molding. The oversize was rejected in this test.

In making the bars, the tempered sand was fed carefully through an elliptical funnel into a steel mold, 4 inches long, 1½ inches deep and ½

inch wide. The sand then was consolidated by three blows centered on a wooden rammer, with the drop weight of the A. F. A. permeability apparatus. Sufficient sand was used to produce a finished bar 1-inch in width.

At the outset, these tests were run in a small, gas-fired, low air pressure furnace; two tests being run at the same tme. The results were unsatisfactory. The sag bars in the second instance were burned in a gas-fired kiln of small dimensions and later put into the previously mentioned furnace, the former kiln serving to preburn the pieces and the latter furnace to produce the sag. This also proved unsatisfactory due to the lack of strength in the preburned pieces. For the final test a kiln large enough to take care of all pieces at once was used. This was a gas-fired, down-draft kiln provided with a muffle.

Rate of heating is probably the most important factor to be contended with in running sag tests. The difficulty of maintaining a regular and definite rate of heating was the chief reason why the small furnace was useless in this test. To overcome this difficulty, that furnace was heated and held at 1000 degrees Cent. until the pieces which had been burned in the gas kiln to that temperature were inserted upon their supports. This proved unsatisfactory. The rate chosen and used in the operation of the large kiln was 100 degrees per hour up to 1000 degrees Cent. and thereafter at 35 degrees per hour.

The results of the sag test run in the large down-draft, gas-fired kiln are given in Table III as determined by an optical pyrometer.

The test is one that easily is duplicated and lends itself to the problem at hand. This test comes a little closer to giving the initial point of failure than does the softening point determination. This was to be expected, since the effective bending moment was much greater and, therefore, less softening was required to cause distortion. The results of the sag tests are lower than the softening points because the reactions had not progressed to the same extent by the time the index point had been reached. This method is not suitable for low bonded sands in use in the foundry.

The purpose of the draw trial test was to determine whether it would be practical to determine the refractoriness of molding sand by noting the effect of different temperatures upon the burned strengths and other properties of the sand.

In this test, the sand was quartered down to a 1000-gram sample, passing through a No. 16-mesh screen, and tempered with sufficient water to allow molding.

It then was poured carefully through a funnel into a steel mold, which was shaped to produce a hollowed cylinder 1¼ inches in diameter with a ⅜-inch hollowed center. Sufficient sand was used to produce a finished cylinder one inch in height. The sand then was rammed with three blows of the drop weight of the A. F. A. permeability apparatus on a steel rammer. The pieces were allowed to dry slowly. The furnace used for this test was the large gas furnace used in the sag tests. The temperature was raised to 600 degrees Cent. at the rate of 100 degrees per hour, and thereafter at 30 degrees per hour. The test pieces were placed upon fireclay trays, those to be drawn at the same temperature being placed on the same tray.

When predetermined temperatures, commencing at 1010 degrees Cent., were reached the furnace was opened and a tray of test pieces was removed quickly to another muffle furnace which was maintained at a constant temperature of 900 degrees Cent. When all the test pieces had thus been transferred to the second furnace, it was allowed to cool slowly.

The test pieces, after slow cooling, were subjected to crushing tests on an Olsen machine.

The test is considered to be of value in that the operator may, with a simple furnace arrangement and a magnifying glass or microscope, determine such points at which a sand can be expected to cause trouble from failure under heat.

Local application of heat test was suggested originally to the committee on molding sands of the A. F. A. by C. M. Saeger Jr. of the bureau of standards, Washington.

In this test a sample of molding sand in the shape of a bar is heated locally by an electrically heated platinum ribbon to increasingly higher temperatures. The temperature at which the sand sinters and adheres to the platinum is taken as the index of the refractoriness of the sand.

In this test, the sand was quar-

Table V

Classification of Sands According to Test Results

Sand No.	Sag Test	Softening Point of Bond Test	Draw Trial Test	Softening Point of Sand Test	Saeger's Test
1	Practically all nonferrous	All nonferrous and gray iron	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray and white iron
2	All nonferrous, gray iron	Practically all nonferrous	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray and white iron
3	Practically all nonferrous	Practically all nonferrous	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray iron
4	.....	.....	.....	All types	.....
5	.....	.....	.....	All types	.....
6	All nonferrous	All nonferrous and gray iron	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray iron
7	.....	.....	.....	All types	.....
8	.....	.....	.....	All types	.....
9	All nonferrous gray and white iron	All nonferrous and gray and white iron	All nonferrous, gray and white iron	All types of casting	All nonferrous, gray and white iron
10	All nonferrous, gray and white iron	All nonferrous, gray and white iron	All nonferrous, gray and white iron	All types of casting	All nonferrous, gray and white iron
11	All nonferrous, gray and white iron	Nonferrous gray and white iron	All nonferrous, gray and white iron	All types of casting	All nonferrous, gray and white iron
12	Practically all nonferrous	All nonferrous, gray and white iron	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray iron
13	All nonferrous	All nonferrous	All nonferrous	All nonferrous, gray and white iron	All nonferrous
14	.....	.....	.....	All types	.....
15	All nonferrous	All nonferrous and gray iron	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray and white iron
16	All nonferrous	Practically all nonferrous	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray iron
17	All nonferrous	All nonferrous	All nonferrous	All nonferrous, gray and white iron	All nonferrous, gray iron

tered to a 1000-gram sample by the usual method and then tempered with sufficient water to permit molding. The entire sample was passed through a coarse riddle and the procedure was followed of preparing the bar for cohesion test as outlined in A. F. A. tentatively adopted methods of test.

The apparatus, while the same in principle as Saeger's was somewhat different in detail of construction. It consists of a pair of brass bars, ¼-inch by ⅜-inch by 12 inches, spaced 3½ inches apart, firmly held parallel by a piece of fiberboard, 2½ inches by 4 inches by ¼-inch, attached by screws near one end of the bars. At the opposite end, a platinum ribbon ½-inch wide and 3/1000-inch thick, extends between the two brass bars. This framework is so mounted, on low standards to a baseboard, that the platinum ribbon may be raised or lowered at will.

The platinum ribbon may be heated to any desired temperature up to 1650 degrees Cent. by means of an electric current, supplied to it through the standards to which the brass bars are pivoted. A rheostat is provided for controlling the current and thus regulating the temperature of the platinum ribbon.

The bar of sand is dried thoroughly and placed on the base of the heating apparatus. The current is turned on and the platinum ribbon heated to a predetermined temperature, observed by means of an optical pyrometer. The ribbon then is lowered so as to lie across the sand test bar near one end of it and allowed to remain in this position for five minutes. At the end of this time the temperature of the ribbon is read and the ribbon is raised from the test bar. That part of the sand which had been subjected to the heat is examined under the microscope for signs of sintering. These operations are repeated in increasingly high temperatures upon fresh surfaces of the sand until marked sintering takes place, as evidenced by the sand sticking to the platinum. Results of this test on the sands are given in Table IV.

Screen analyses of the sands tested were made according to specifications of the A. F. A. standard and tentatively adopted methods of testing and grading foundry sands. The results obtained are given in Table I.

The results of tests show that there is no relation existing in the fineness test whereby we may be assisted in the determination of the refractoriness of a sand. This is understood easily when we consider the mineralogical and chemical composition of the sands in question, which vary one from another to such an extent. The use of the fineness factor relative to refractoriness is limited to sands which vary one from the other only in this respect.

It will be noted that a general relationship exists in the figures of Table III. To begin with, the shrinkage of the bond away from the grain occurs in all instances at temperatures below 1050 degrees Cent. Most of the bonds have a short shrinkage period before becoming vitrified. In the case of sands Nos. 9, 10 and 11, the bonding substances are of a much more refractory character and the longer shrinkage period is evidence of this fact. The temperature of sag, or tendency to distort, links with the temperature at which a strong matrix is present in the cooled trial test. The differences in temperatures between the vitrification of the bond and the softening point of the bond represent the ranges of reaction before the bond has entered an entire liquid phase and has lost its viscosity sufficiently to cause the cone to bend over. In all but two instances (Nos. 9 and 10) the bond softens before the whole sand.

The figures given as results of Saeger's test have no definite relationship with the other tests. This is not surprising, since the processes of heat application are so widely different. The Saeger test consists of the application of heat to the surface of the sand, while all others consist of a soaking heat throughout the specimen. It will be noted (as would be expected) that the temperatures of failure as determined by the Saeger method are for the most part higher than in other tests. The important point is that while the other tests are interesting, it does not seem that they reproduce as nearly as does the Saeger test, the conditions met in the foundry. While the test may be improved upon in several details, it is felt that it is the best method as yet suggested for a fair test of the refractoriness of a molding sand.

Table VI gives temperature ranges taken from a paper by Andrew S. Hall, entitled, "Pyrometer Control in a Brass Foundry," *Transactions*, American Foundrymen's association, vol. 34.

Although the various tests gave different resulting temperatures of failure, Table V shows that the classification of the various sands according to the various tests is fairly consistent. The softening points of the sands test gives higher refractory values than the others and is the only one which is out of line. Considering this fact and the initial cost of the Saeger equipment, it would seem that, while Saeger's test offers an ideal way for testing the refractoriness of a molding sand, the clay bond softening point, the draw trial test and the sag test are worthy of consideration.

Before the adoption of any test as a standard, the indices of that test must necessarily show a direct relationship to the experience of commercial practice. Practically nothing is available concerning the relationship of refractoriness tests of molding sands to the experience of commercial foundry practice. Without this correlation any test is of unproved value. With this reservation in mind the sands have been clasified as above.

This classification has been made only according to the results of the various tests.

In 1928 domestic metallic magnesium to the extent of 483,000 pounds and valued at $587,000 was sold or used in the United States.

Table VI

Casting Temperatures of Metals

Metal	Mixture Per Cent	General Work Deg. Cent.	Light Casting, Deg. Cent.	Heavy Casting, Deg. Cent.
Aluminum	Pure	760	.....	.....
"	Alloy	705	705	676
Red brass	85-5-5-5	1095	1175	1095
" "	82-4-6-8	1095	1145	1065
Yellow brass	15-20 Zn	1095	1145	1065
Phosphor bronze	80-10-10	1065	1095	1040
Manganese	.....	980	1065	970
Acid resisting bronze	87 Cu, 7 Sn, 6 Zn	1175	1145	1095
Bronze	88 Cu, 4 Pb, 6 Sn, 2 Zn	1095	1145	1095
"	70 Cu, 6 Sn, 20 Pb, Others 4	1175	.....	.....
"	87 Cu, 8 Sn, 5 Zn	.....	1220-1145	1040-1065
Ni Bronze	84 Cu, 10 Sn, 2 Zn, 4 Ni	1145	1175	1145
Gun metal	88-10-2	1120	1145	1095
White iron	.....	1410	.....	.....
Gray iron	.....	1320	.....	.....
Converter steel	.....	1535	.....	.....
Basic electric steel	.....	1545	.....	.....
Acid electric steel	.....	1535	.....	.....

Nonferrous figures from "Pyrometer Control in a Brass Foundry," by A. S. Hall, *Transactions*, American Foundrymen's association, Vol. 34, 1926.

The FOUNDRY Family Photograph Album

Upper Left

H. H. WEISS

Superior Die Casting Co., Cleveland

Lower Left

H. H. HALEY

American Foundry Equipment Co., Detroit

Upper Right

W. K. LEACH

General Alloys Co., South Boston, Mass.

Lower Right

R. L. HAM

New England Foundry & Machinery Co., Boston

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

TENTATIVE STANDARD FOR GRAY IRON

For Valves, Flanges and Pipe Fittings

1. These specifications cover gray iron for castings such as valve bodies, fittings, flanges, including parts to be assembled into valves, manufactured in advance and supplied for sale from stock by the manufacturer, jobber, or other dealer.

Two classes of castings are included as follows:

Class A.—Regular gray iron.

Class B.—Higher-strength gray iron including the so-called semi-steels used in valves and fittings.

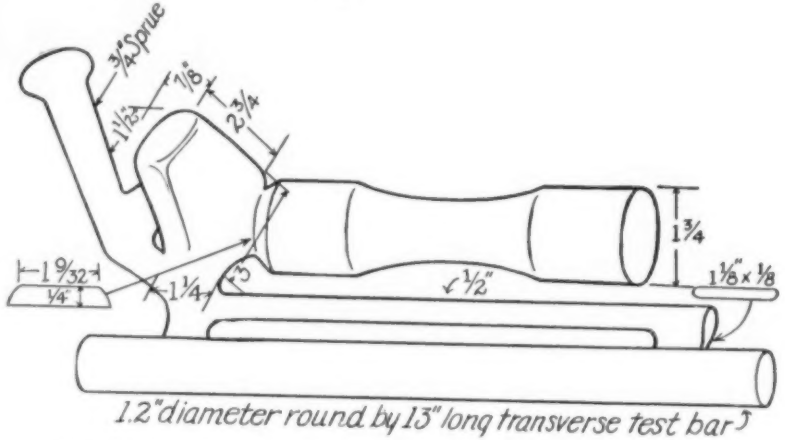


FIG. 1—TENSION AND TRANSVERSE TEST SPECIMENS AS CAST

2. The iron shall be made by the cupola, air furnace, electric furnace, or other approved process. The iron shall be produced under regular chemical and physical control and shall be gray iron of high quality.

3. Drillings taken from test ingots, broken test specimens or from castings shall conform to the following requirements as to chemical composition:

Sulphur ..... not over 0.12 per cent
Phosphorus ..... not over 0.75 per cent

4. (a) The tension test specimen shall conform to the following requirements as to tensile strength:

Class A, Regular gray iron..... not less than 21,000 lb. per sq. in.
Class B, Higher-strength gray iron....not less than 30,000 lb. per sq. in.

Abstracted from the 1929 American Society for Testing Materials *Tentative Standards.*

(*Continued on Data Sheet No.* 794)

TENTATIVE STANDARD FOR GRAY IRON

For Valves, Flanges and Pipe Fittings

(*Continued from Data Sheet No.* 793)

(b) After reaching a stress of 15,000 pounds per square inch, the speed of the cross-head of the testing machine shall not exceed ⅛-inch per minute.

5. (a) The transverse test shall be optional. When transverse tests are made, the transverse test specimen, when placed horizontally upon supports 12 inches apart and tested under a centrally applied load, shall conform to the following requirements:

	Regular Gray Iron	Higher-Strength Gray Iron
Load at center, pounds.....	not less than 2500	not less than 3300
Deflection at center, inches.....	not less than 0.10	not less than 0.12

(b) The rate of application of the load shall be such that a central deflection of 0.10-inch is produced in from 20 to 40 seconds.

(c) In case the transverse test specimen varies from the specified diameter of 1.20 inches, a correction factor conforming to the following shall be applied:

Diameter of Transverse Test Specimen Inches	Correction Factor	Diameter of Transverse Test Specimen Inches	Correction Factor
1.10	0.770	1.21	1.025
1.11	0.791	1.22	1.051
1.12	0.813	1.23	1.077
1.13	0.835	1.24	1.103
1.14	0.857	1.25	1.130
1.15	0.880	1.26	1.158
1.16	0.903	1.27	1.185
1.17	0.927	1.28	1.214
1.18	0.951	1.29	1.242
1.19	0.975	1.30	1.271
1.20	1.000		

6. One mold containing one or more tension test specimens and, when desired, one transverse test specimen, made as indicated in Fig. 1 shall be poured at least twice a day from each heat from which castings are made under these specifications. The molds for these test specimens shall be made from plate pattern, on a standard molding machine if possible, from the same lot of sand and in the same general way as that in which molds for the castings are made. Each specimen shall be marked to show cupola or furnace number, date and hour when the mold is poured by either casting in the mold or stamping the specimens as soon as possible after shaking-out.

Note.—The numbering which is shown on the test specimen in Fig. 2 is intended simply to illustrate a method of designation. In the particular method shown 12/8 refers to December 8, B1 is the cupola number and the numeral 1 which follows shows the hour cast (1 p.m.).

(*Concluded on Data Sheet No.* 795)

Rigid Mold

Required for Heavy Steam Table

By R. H. Palmer

LOCAL conditions and presence or absence of equipment and facilities, are the deciding factors which must be taken into consideration by a foundryman confronted with the job of molding a heavy casting. Before criticising the method adopted in any particular case the critic should familiarize himself with the prevailing conditions and then usually he will admit that under the circumstances he probably would have followed the same course—with perhaps a few modifications, depending on his training and experience.

Several years ago the firm with which I was connected received an order for a large steam table, 10½ inches thick, 6 feet 5 inches wide and 17 feet 9 inches in length. Just a plain, big iron slab, but it had to be machined all over and show a perfectly clean surface. Also 13 long steel tubes 1⅜-inches in diameter had to be placed in the mold and incorporated in the casting.

To secure a clean face I decided to mold and pour the casting on edge and to do this I had to have an iron casing in the floor. The owner of the foundry was of the opinion that the casting could be molded and poured flat. He admitted that the edge method presented some favorable features, but he (naturally) objected to the expense of the proposed rigging on which I insisted. He claimed that even if the mold was made on edge it could be done quite safely in a pit dug in the floor. In a final show down involving the alternative of making the job my way, or, resigning, he told me to go ahead according to my best judgment. After the job was started several comforters told me I certainly would lose the casting.

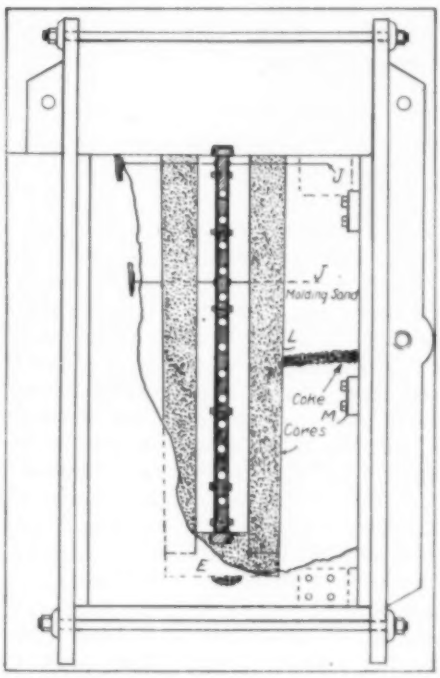


FIG. 2—CROSS SECTIONAL VIEW OF MOLD WITH TUBES, SIDE AND BOTTOM CORES IN PLACE

Iron plates 2½ inches thick for the sides and ends, also two plates 3 inches thick for the bottom, were cast in open sand molds. The side plates were cast in two sections and afterward bolted together through a third plate which lapped over the seam as may be noted at *M*, Fig. 2. With the binders for the sides the total weight of the rigging equaled or slightly exceeded that of the casting, but it did not constitute a direct cost against the first casting. Orders for several others were anticipated. Also the iron plates always retained their intrinsic value as so much scrap iron in the event they were broken and returned to the cupola. The only really direct expense was that involved in making the molds for the plates and in melting the iron. That expense quite properly might be charged as premium against the insurance which the plates afforded. In effect the plates formed a cast iron box or drag rammed solidly in a pit in the floor and reinforced with vertical binders

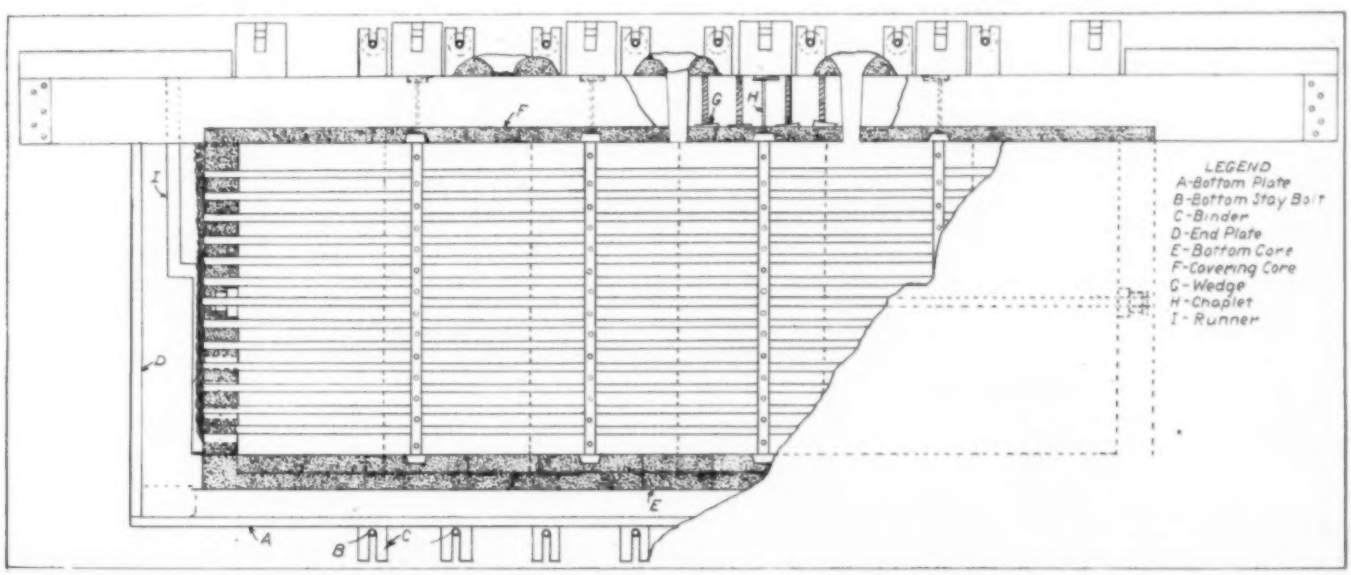


FIG. 1—VERTICAL SECTIONAL VIEW OF COMPLETED MOLD SHOWING MANNER OF SECURING THE TUBES IN PLACE

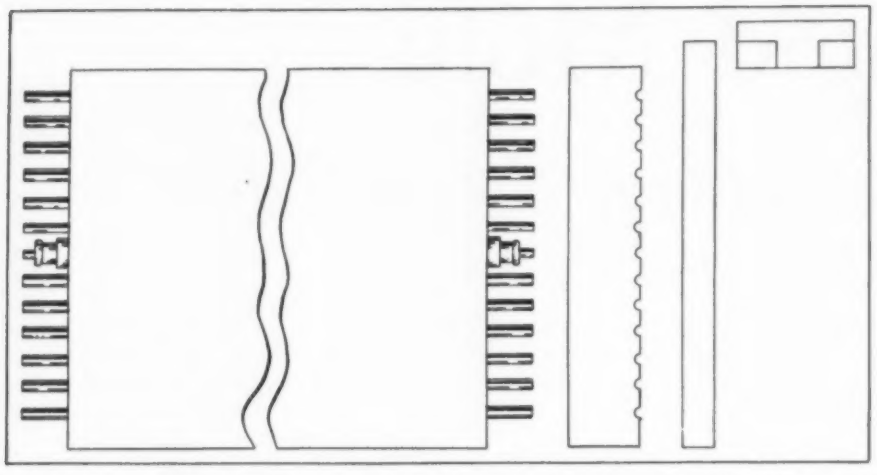


FIG. 3—LEFT—DETAIL OF END AND BOTTOM CORES. RIGHT—THE CASTING 10½ INCHES THICK, 6 FEET 5 INCHES WIDE AND 17 FEET 9 INCHES IN LENGTH

held together top and bottom with 1-inch steel bolts.

In the longitudinal and cross sections of the mold shown in Figs. 1 and 2 it will be seen that a green sand mold first was formed inside the cast iron casing and then this green sand mold was lined with dry sand cores to form the outside dimensions of the proposed casting plus the natural contraction. The top of the mold also was covered with dry sand cores containing suitable openings for the risers and prints for the reception of the upper ends of the standards supporting the steel tubes. As an added precaution, a long stem chaplet *H*, Fig. 1, was placed over each of these prints and wedged at the top end under one of the weights resting on the cope.

The bottom of the pit was rammed exceedingly hard to form a solid foundation. The bottom staybolts were placed in shallow channels in the sand and then the bottom plate in two sections was rapped down to a solid bearing. The side and end plates were erected on this foundation and bolted to each other through suitable lugs. The vertical binders were adjusted in place on the outside of the side plates. The bottom staybolts engaged them at the lower end and similar bolts were inserted at the top. These bolts were drawn reasonably tight and the sand was rammed solidly between the iron casing and the walls of the sand pit. The side plates were braced apart at the top during this ramming operation. Afterward the braces and upper staybolts were removed temporarily to facilitate placing the pattern and cores.

A level bed of sand was rammed over the bottom plate to receive the cores designed to form the bottom face of the casting. A train of fine coke from a channel under these cores was extended to points at the side where a long upright stick was placed. These sticks eventually were removed and left openings in the sand through which the gas from the burning cores escaped. The bottom cores were trued with a line and level and then a comparatively rough board pattern was set in place. Heap sand was rammed in all the side space between this pattern and the iron casing. The ends were left open until after the side cores were placed. Reinforcing rods were bedded in the sand at several stages. Layers of fine coke also were incorporated at several levels to facilitate the escape of gas and steam during the pouring period. The pattern then was removed and the large slab cores to form the sides of the mold proper, were lowered into place. A shoulder on the bottom core held the side cores the proper distance apart on the inside and the green sand wall at the back prevented them from spreading during the assembly or when the mold was filled with iron.

Single length extra heavy pipes filled with silica sand and a little core binder were dried thoroughly in the oven. Then they were assembled as a unit and placed in the mold. Cast iron spacing blocks held them the proper distance apart from each other while the entire assembly was held together by five pairs of flat steel straps with bolts extending through straps and cast iron blocks. Cone shaped pieces top and bottom guided the standards into core prints. Pipes and binders were cleaned and then covered with a coating of red lead and gasoline. Stem chaplets *J*, Fig. 2, extended through the side cores held the pipe assembly upright and in the center of the mold. The number, shape and method of applying the end cores are shown in Fig. 3. Suitable gaps in the cores embraced the pipes near the ends and held them in a vertical center line.

Four of the in-gates are shown in the lower core in Fig. 5. They were placed in the position within 1 inch of the side wall of the mold on the theory that any dirt developed would travel toward the center of the casting where it would become trapped by the pipe assembly. Similar gates were placed in the opposite half of the core, also in the corresponding cores

(*Concluded on Page* 1071)

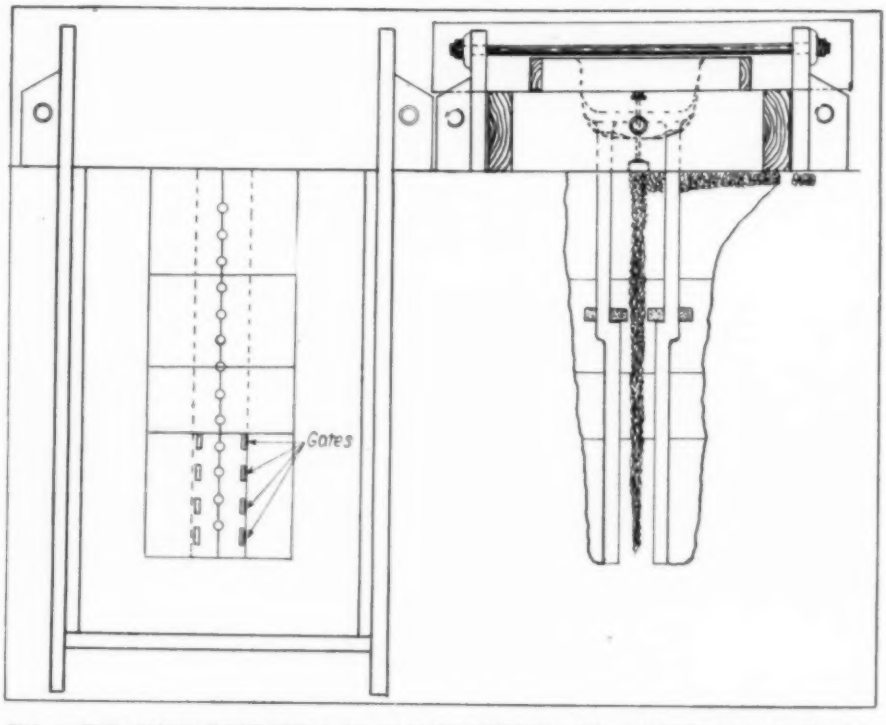


FIG. 4—END CORES WERE BUILT UP IN FOUR SECTIONS SPLIT VERTICALLY THROUGH THE CENTER TO EMBRACE THE TUBES. FIG. 5—THE STEP IN THE UPRIGHT RUNNER WAS COVERED WITH A FLAT CORE

Making *Agricultural* IMPLEMENTS

By H. Bornstein

Fig. 16—Pouring a Cast Iron Hub on a Built Up Wheel

CASTINGS for harvesting machinery fall within the general classification of gray iron castings for agricultural implements. A typical analysis of such castings would be as follows:

	Per Cent
Silicon	2.15
Sulphur	.10
Phosphorus	.40
Manganese	.55
Total Carbon	3.35

Considerable machine work is done on a number of these castings, so it is quite important that the composition be kept within close limits and it is necessary to prevent the occurrence of any chills. Furthermore, it is desirable to have a fairly strong iron, and a cupola mixture containing some steel scrap is generally employed. One of the mixtures used is 35 per cent pig iron, 10 per cent steel scrap and the balance consisting of returns, home scrap and purchased scrap.

Gray Iron Castings

MANUFACTURE of gray iron castings for agricultural implements is described in this article, which is the second of two abstracted from a paper presented before the recent meeting of the Association Technique de Fonderie de France in behalf of the A. F. A. The first section appeared in the Dec. 1 *issue of* THE FOUNDRY *on page* 1001.

In most of the agricultural implement foundries, the test bar used is cast separately and is a transverse test bar. A bar 1-inch square and 15 inches long is cast horizontally in a green sand mold. The bar is broken on supports 12 inches apart. A breaking load of 3000 pounds is considered quite satisfactory. Comparisons made with the arbitration bar of the American Society for Testing Materials indicate that a breaking load of 3000 pounds on the 1-inch

Fig. 17—Sand Is Fed Through a Series of Down Spouts from the Conveyor

Fig. 18—Two Moldboard Floors Ready To Pour

square bar is equivalent to a breaking load of from 3700 to 4200 pounds on the arbitration bar, which is a bar 1¼ inches in diameter and 15 inches long, cast vertically in a dry sand mold and which is broken on supports 12 inches apart. The tensile test for cast iron is not used to any considerable extent in the testing of implement castings.

A number of foundries turning out harvester castings have a large production and many mechanical methods have been installed. Sand handling systems and conveyor molding methods are in use at some foundries. At one of our foundries, a stationary type sand slinging machine is used together with a sand handling system and a revolving table for the molds. Fig. 23 shows the pouring off of the molds, which are on the revolving table. The machine and the crew are shown in the background. Fig. 19 shows the molding equipment with the sand delivery chute in the upper left hand corner.

The first sand slinging was installed to make mower wheels. Under the old method, the crew consisted of four molders, two on the drag and two on the cope machines. The patterns were on stripper plate machines. These molders produced 120 wheels in nine hours. The sizes of these flasks are 36 inches, inside diameter, and each flask is 5 inches deep. With the use of the new machine and a crew of four men, the operator and three helpers, 380 wheels are made in a nine hour production cycle.

The second machine and sand handling system was installed to make mower frames and other castings. Up to that time, the crew consisted of five men, one being a core setter, two molders on the drag, and two molders on the cope. A production of 80 castings was obtained in a nine hour day. After the change and with the same pattern, a crew of six men, an operator, three helpers, and two core setters, produced 190 castings.

The greater portion of the wheels used for farm implements and tractors consist of wheels having steel tires, steel spokes, and a cast iron hub. A considerable quantity of cast iron is used to produce the hubs and boxes for these wheels.

There are two distinct methods for making these wheels. In one method, the cast iron hub is made first and the wheel is built around the hub. The wheel is built from the center out. In the other method, they begin with the steel tire and work down to the hub, the casting of the hub being the last operation. In this method the wheel is built from the outside toward the center.

Fig. 20—Casting the Wheel Hub with the Wheel in a Horizontal Position

Fig. 19—Molds Are Carried to the Pouring Station on Conveyors

The metal used for wheel hubs in the method where the hub is cast first is as follows:

	Per Cent
Silicon	2.25
Sulphur	.10
Phosphorus	.30
Manganese	.60
Total Carbon	3.50

The metal used for hubs for wheels where the hub is cast last is as follows:

	Per Cent
Silicon	2.50
Sulphur	.10
Phosphorus	.40
Manganese	.55
Total Carbon	3.40

A somewhat softer metal is used because in the latter case, and the hubs are cast in permanent molds.

Figs. 17, 21, and 22 show views in the foundry of the wheel plant which builds its wheel from the hub out. This foundry is interesting in design and has a sand handling system and mold conveyors.

Continuous production is provided by molding and pouring on a revolving turntable. This turntable is a big platform like a circular sidewalk, 90 feet in diameter and about 3½ feet wide. It is carried on a single line of wheels which run on a circular track and is kept moving at a speed of 19 feet a minute, by an electric motor. It thus makes a complete revolution in 15 minutes. A view of a portion of the revolving turntable and some of the molding methods that are used, are shown in Fig. 17.

Fig. 22—The Cupola Is Located Near the Turntable

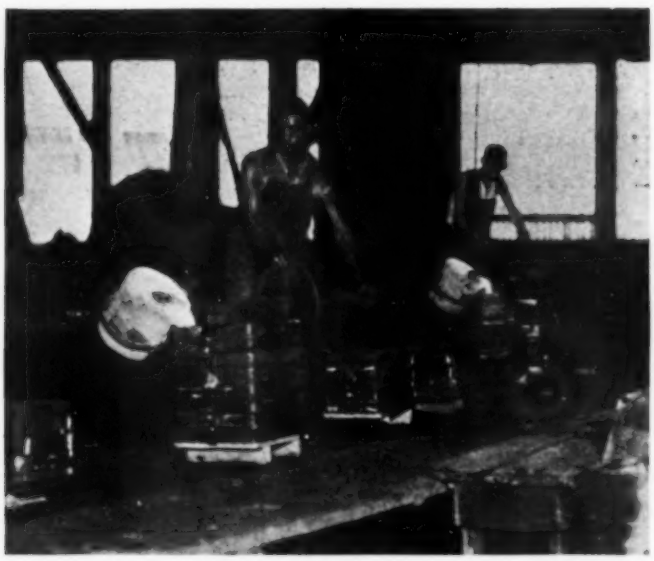


Fig. 21—Finished Molds Are Carried to the Pouring Zone

The foundry proper is on the second floor, leaving the first floor free for storage of sand, limestone, coke, pig iron, castings, etc. The rattling, chipping and grinding, and rough machining operations also are done on the first floor. This not only saves space but results in an unusually clean and neat foundry. The sand is run through a hopper and mixer on the first floor and is carried by a bucket conveyor to an endless trough above the circular molding table. From this trough it is fed through a series of downspouts, which are shown in Fig. 17.

Cores are brought on trucks and placed near the molder's station. The molder draws his sand from the spout, selects the core and makes his mold, which then is placed on the moving table. Thus a constant procession of completed molds passes around to the pourers and are filled with molten metal. A view of the pouring is shown in Fig. 21. The arrangements of the cupola and turntable is shown in Fig. 22. Ordinarily, two pourers can keep the mold filled, but a third can be added, if necessary. The pourers operate one-man ladles, suspended from a monorail which makes a complete circuit from the pouring space to the three cupolas and back again. Thus, the pourers continually are working toward the unfinished molds, riding with the flasks as they pour. The cupolas are arranged in a row, as close together as practical on the side of the table where the pouring is accomplished.

As the molds leave the pourers, the top weights are removed and a minute later, they reach the dumping barrel. If the mold is large and the iron has not had time to set, it is allowed to make a complete revolution with the turntable before it is dumped. If it is small, it is pulled off the table and dumped upside down on a tilting tray. The flask is set back on the table and both the casting and the sand are dumped into the barrel.

The dumping barrel is a circular iron grating through which the sand falls into the hopper below, while the casting is rattled around in the barrel, breaking off the gate and fin and knocking the sand loose. All this time, the casting is working toward the end, out of which it presently tumbles into a chute leading to the

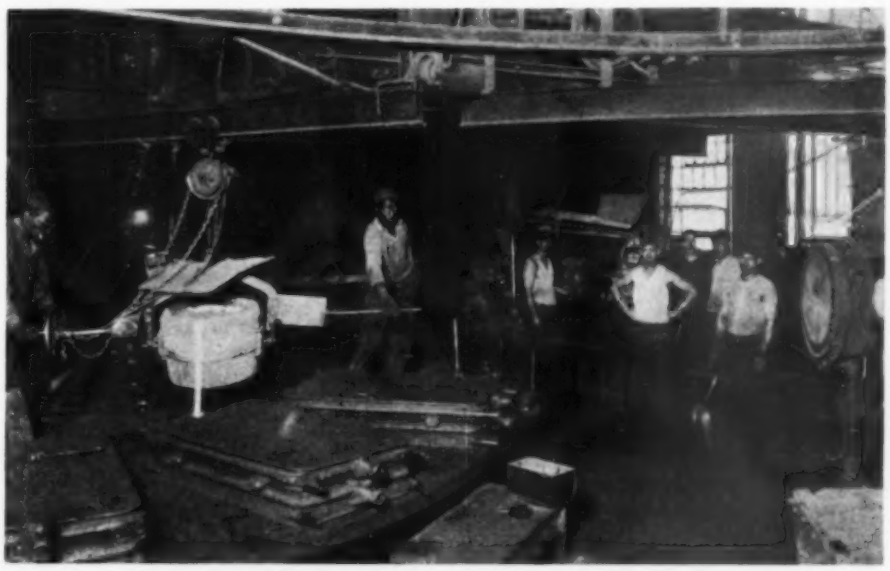


Fig. 23—Molds Are Poured Off on a Revolving Table

Fig. 24—Closing a Large Transmission Case Mold

cleaning room on the first floor. By this time the casting is practically clean. It is noticeable that, while the molding, pouring and dumping operations are going on continuously from morning until night, the air is comparatively free from smoke, steam, and dust. This is due to the fact that the hot sand passes down into the hopper and is dumped almost immediately. The continuous operation and concentration of each man on his particular job has increased the production of each workman. The production per man ranges from one to two tons per day. The weight of iron per mold ranges from 16 to 50 pounds. Practically every job in the foundry has a piecework price set on it. In addition, the molders get a bonus based on the quality of the castings produced. The lower the percentage of poor castings, the greater is the bonus earned by the men who do the work.

Figs. 16 and 20 show views of the pouring of the cast iron hubs in the plant where the wheel is built from the outside to the inside. Permanent molds used for this work.

Farm tractor castings are subjected to considerable machine work. Requirements as to strength and pressure tests also are severe, which means that sound castings, free from porosity are required. Consequently, the requirements for farm tractor castings are more severe than for the general run of implement castings that are made.

For the large majority of tractor castings, one composition of iron may be used. As a matter of convenience, it is customary to make only one grade of iron in the cupola. Then, alloys may be added to the ladle to secure the necessary modifications for some of the castings. A typical analysis of the metal coming from the cupola in one of the large tractor foundries is as follows:

	Per Cent
Silicon	2.30
Sulphur	.08
Phosphorus	.20
Manganese	.60
Total Carbon	3.40

It is customary to use from 40 to 50 per cent of pig iron in the charge, and from 10 to 15 per cent of steel scrap. The balance of the charge consists of returns, home scrap and purchased scrap. Hot iron is required for the pouring of a large number of the castings and considerable care is taken to insure hot metal coming from the cupola. A minimum temperature of 2700 degrees Fahr. (measured with an optical pyrometer) is desired.

Transverse test bars are used for a routine check on the strength of the iron and occasionally tensile tests are made. Transverse test bars, American Society for Testing Materials arbitration test bar, 1¼ inches diameter, will show a breaking load in the neighborhood of 4000 pounds. The tensile strength required is a minimum of 30,000 pounds per square inch.

These figures apply to the metal coming from the cupola spout and without ladle additions. For cylinder iron, it is customary in some foundries to make ladle additions of nickel or of nickel and chromium. This results in an increase in strength. For light castings, ladle additions of ferrosilicon are made, and on this iron

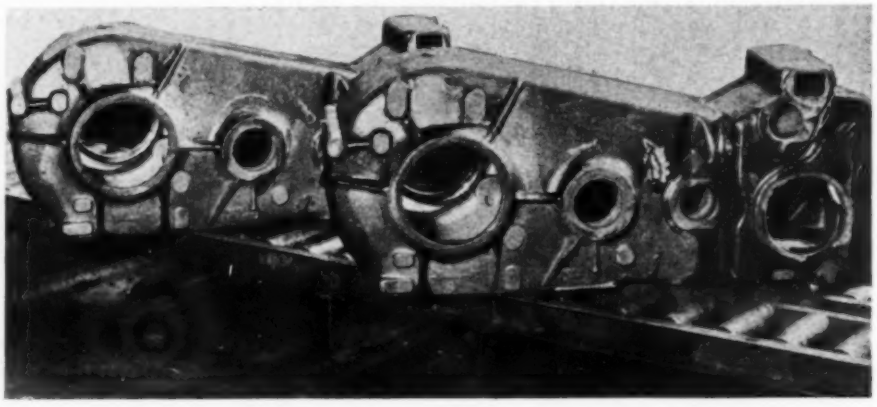


Fig. 25—Transmission Case for a Farm Tractor

Fig. 26—Setting the Cores for a Transmission Case

the arbitration test bar will show less strength. The principal reason for adding nickel and chromium to the cylinder iron is to obtain a greater brinell hardness in the bore of the cylinder and consequently secure better wear resistance without sacrificing machinability. Field tests which have been made recently indicate the value of the alloy additions in securing wear resistance.

Occasionally, impact or drop tests are made on test bars or castings to measure or to compare the resistance to shock. The test is made by dropping a hammer of known weight onto the test bar or casting and gradually increase the height until failure occurs. We have found this method of test to be satisfactory.

Machinability of castings is an important item where high speed production is required. In a number of castings, strength is not a considerable factor, while machinability is important. This is particularly true on some of the smaller castings. For such a casting, an annnealing treatment, or heat treatment, is prescribed. It is customary to use a thoroughfare type of furnace for this heat treatment. The castings first enter the cool zone of the furnace and then travel through to the hotter portion of the furnace and then continue through a cooling zone and finally come out at a temperature of about 600 degrees Fahr. The maximum temperature for this annealing varies considerably at different plants. For increase in machinability, the temperature used will range from about 1100 degrees Fahr. to 1600 degrees Fahr. We prefer an annealing temperature of 1250 degrees Fahr. We find that this increases machinability sufficiently without a material decrease in the strength of the casting.

There is still another type of heat treatment used for tractor parts and for various automotive parts. Castings such as pistons are given a heat treatment before machining to eliminate warpage after machining. In other words, this treatment is to relieve internal strains in the casting. For this purpose, a temperature of about 1000 degrees Fahr. is sufficient. There are some castings in which it is desirable both to eliminate strains and also to soften to increase machinability. For such castings, the higher temperature range is used for the heat treatment. In the heat treatment of cast iron, it is important to exercise care in the initial heating. Putting cold castings into a hot furnace is dangerous, inasmuch as breaking of the castings may occur. For this reason, the thoroughfare type of furnace, with its preheating feature, is desirable.

Fig. 29—Making Molds for a Tractor Rear Axle Housing

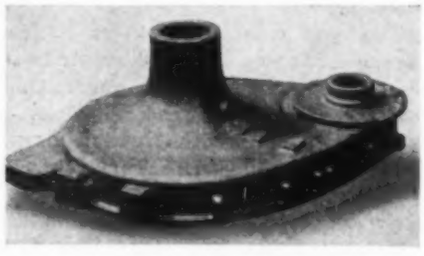


Fig. 28—Finished Casting for Rear Axle Housing

Tractor foundries usually have a high production on a relatively few number of patterns. Consequently, this type of foundry lends itself better to sand handling systems, conveyor molding, etc. than do other farm implement foundries.

At a number of tractor foundries, sand handling systems and mold conveyors have been installed. The practice at these foundries is similar to that employed by automobile foundries. At other foundries, sand slinging machines are used. Two types may be used, one the stationary type and the other a tractor type. In the stationary type, the sand is brought to the machine by some sand conveying system, while in the tractor type, the machine moves through the sand pile. Fig. 25 shows a transmission case for a tractor. Fig. 28 shows a rear axle housing for a tractor.

For the production of the transmission case, a crew of 23 men is used to mold and pour, their duties being divided as follows:

1 machine operator.
4 sand rammers.
2 machine helpers.
5 general helpers.
1 core cutter.
1 core cutter helper.
1 inspector.
3 mold closers.
1 core deliverer.
4 pourers.

A 13 foot tractor type machine is

(*Concluded on Page* 1070)

Fig. 27—Pouring a Rear Axle Housing Casting

Bill Melts a Bronze Heat in a Cupola

By Pat Dwyer

HAVE you ever considered the idea," Bill inquired the other night. "Have you ever considered the idea of going to Russia?"

"Is that a proposition, an offer, a feeler?" I asked him, "or, is it just an idle question? Of all the places, here, there and elsewhere, why should you think of Russia?"

"Why," Bill remarked lazily. "I just asked you a simple question. Is there any particular reason why you cannot give me an equally simple answer?

"If I had asked you to deliver an opinion on some deep and abstruse problem, something that would jar your mind out of its lazy groove, I could appreciate your natural reluctance, but in this instance all I ask is a simple yes or no. Nod your head, or shake it, if the effort of talking imposes too great a strain. You are gabby enough sometimes. In fact, occasionally you remind me of a young crow, all gab—"

"Yes, yes," I interrupted hastily. "I know all about the young crow. His first name was Bill and, in the event you may be interested, his last name was McGaw. The name is hereditary and runs in the family, like a wooden leg or the ability to talk all day about nothing, or to ask silly questions to which there is no answer." "Do you mean that your answer is 'No'?" Bill inquired exasperatingly. "No," I said, "I did not mean no, I meant—dash it all you have tangled the thing up to such an extent that I don't know whether I am coming or going. Let's shake it out and start over again. Put down your old rollover board and I'll show you that your pattern is back drafted, your flask is upside down and that your sand—and yourself—are all wet." "Fair enough," Bill replied. "Shoot if you must this old gray head—but—I'll see you later. March on, she said." "You ask me a question," I said, "that involves a critical survey of all the thoughts I have had, and then you say 'Come on now, yes or no' after the manner of the small boy who triumphantly has taught his dog to bark when he says 'Speak, Rover, 'at's a good dog. Speak!'

"At one time or another my mind may have wandered off in the direction of Russia, but that is a long way from saying that I ever dwelt seriously on the prospect of actually transporting myself bodily into the country.

"If you want to look at it from another angle, I have visited the country in imagination many times while engaged in reading books or articles dealing with Russian people, events or conditions. Therefore, my dear lad, if you had asked me if I ever had visited Russia I could say, truthfully, yes and no. The same answer applies to your first inquiry touching on whether I ever had considered the idea of going to Russia. My answer in either case would be perfectly logical, but it would do you no good. Therefore, for the second time, why should I attempt to answer your silly question? Now, my boy, climb out of that trench. In approved legal style, the defense rests its case. The prosecution may begin."

SIDE DOORS STILL ARE OPEN FOR BUSINESS

"Well," said Bill, "I'll tell you. The question was prompted by a desire to see whether you had any knowledge of the subject, or, if you held any decided views, pro or con, as the boys say, on the situation over there. I rather expected to find you filled up with a rehash of all the tripe that passes in the papers for information. I thought you would say 'No' in a loud ringing voice. Then after you had painted the most sickening picture of poverty, misery, sickness, death and banishment to Siberia, I would have the pleasure of setting you properly in your place at the bottom of the class, by quoting what a prominent Russian engineer told me recently.

"He is the manager of an immense new plant now going up in Russia and he was in this country on a tour of inspection and to confer with the starvation, battle, murder, sudden American engineering firm which had designed the plant. In common with a surprisingly large number of highly educated Europeans, he spoke English readily. For that matter, he also spoke German and French and modestly admitted that he had a working knowledge of written Spanish and Italian. According to what he told me Russia is the coming country. It has recovered almost completely from the throes of the recent revolution and the bands are playing 'When Johnny Comes Marching Home.' In a manner of speaking the country may be compared to a patient that suffered for years from a painful and particularly malignant disease. The work of the revolution may be compared to the work of a master surgeon who cut

sure and deep into the very vitals. 'Twas a desperate case and the result of the operation meant either life or death. Life meant hope, and death meant a surcease from suffering.

"The operation was a success and while the recovery of the patient has been slow, it has been steady. Now, like a giant refreshed and steady on his feet, Russia is preparing to take a prominent place among the other nations.

"In some respects it is in the same position as this country at the close of the Civil War and during the financial panic that followed closely after the cessation of hostilities. To be more accurate, perhaps it should be compared with the section of the country which sacrificed everything for a lost cause in the four bitter and heart breaking years of that historic struggle. Before the next fifty years have elapsed, Russia will be in a position to give any nation a run for the money. It has the population, the territory and the natural resources. All it needs now is time and money. Time is a common commodity. No man or group of men has any monopoly on time—yet. As for the money—well—you know and I know, that money in any quantity or any volume, always is available, if those who own or control it are satisfied with the collateral offered and if they see any reasonable prospect of good fat, juicy dividends.

"Furthermore," Bill continued. "Just to show you which way the tide is setting, I read an item the other day in the paper to the effect that the buying organization, which represents Russia in this country, has prepared a book of 6000 items and a list of 1000 American firms for circulation in Russia. The book was prepared by men who are familiar with the needs of the country. Also familiar with the capacity and ability of the various firms listed to meet these needs.

"Finally, young-feller-me-lad, I read today of a steamer that cleared from the port of New York yesterday with a miscellaneous cargo, including 300 tons of machinery to be discharged at Black Sea ports. She will bring back 3000 tons of manganese ore. That's the kind of hands-across-the-sea stuff that means more than an idle gesture."

"Well," I admitted, "the outlook seems promising, but one swallow does not make a summer. Also it seems to me that a canny lad yclept Robbie Burns once coined a slogan, 'The best laid plans of mice and men gang aft agley.' I prefer to wait for some time—"

"You are so canny and cautious," said Bill, "that when Gabriel blows his trumpet for the first time, you will ignore it and remark to the other stiffs in your immediate vicinity, that it probably is a false alarm. You will wait for the third or fourth hurricane blast and then come creeping in to find that all the choice seats have been taken."

"You are slipping, Bill," I said. "Your old argument will not hold water, even if it is all wet. Coming in late to answer Gabriel's call presents a certain decided advantage. Perhaps you have forgotten what happened during a performance of Faust in a theater in Dublin many years ago.

WHEN THE SALESMAN MEETS REAL SALES RESISTANCE

"Mephistopheles was a big, portly gent, who tipped the scale, as they say over home, at about 20 stone. The trap door in the stage had been designed for the ordinary or garden type of actor with marcelled hair and a straight front. When the time came for old Meph to disappear through the trap door in a cloud of red fire, he stuck about half way. One of the gallery gods, as usual, came to the rescue. 'Thank God,' he exclaimed loudly and fervently. 'Hell's full!'"

"So are you," Bill remarked. "Full of shellac. Why don't you stick, like a man, to the main subject, instead of dragging in actors like so many red herrings across the trail?"

"Some trail," I said. "All the way to Russia and back again the same day." "Well," Bill grinned reminiscently, "I'll admit it was faster than the trip a friend of mine in Nova Scotia made to Archangel one time in a topsail schooner. They were jammed in the ice for three weeks and for two weeks of that period all they had to eat was red herrings and tea. He claimed ever afterward that the sight or smell of the things knocked him out for the remainder of the day. Just ruined his stomach and his sense of taste and smell. Before taking the trip he was, even as you and I, accustomed to live on plain wholesome fare. As a result of his harrowing experience he developed an appetite on the same plane as that of a hyena. Without batting an eye or holding his nose I have seen him shoveling hunks of liederkranz and limburger cheese into a capacious maw originally accustomed to such innocuous fare as corn beef, or tripe and onions. He never was the same man again. Fair ruined him, it did." "Probably, I said, "since the book was prepared on this side by men presumably familiar with the intricacies of both the English and the Russian languages, the translation will be accurate. I have read of many funny mistakes made by translators. Usually they are fairly familiar with the words in both languages, but when they hit an idiom or a technical term they miss the target altogether. In one instance one of these brave lads translated the perfectly familiar English term *monkey wrench* into the literal, *wrench for monkeys.* In another paragraph he rendered *brass washers* into *washing machines for brass.* A friend of mine came across a Spanish translation of an English paper dealing with the operation of a cupola. At several points the translator used the term *driving belt.* My friend was quite puzzled until a careful reading of the context showed that the translator had taken the term *wind belt* literally and had assumed that it was some kind of a leather or rubber belt for transmitting power.

"The funniest one turned up recently in a technical publication where a translation of a German paper appeared dealing with blast furnace gases. In the original, a statement appeared to the effect that hundreds of gas analyses had been made and thousands of temperature determinations had been taken. In the published translation the statement appeared: Gas analyses had been made by Hunderden and temperature de-

terminations had been taken by Tausanden! Apparently the translator assumed that his readers were perfectly familiar with the names of these two eminent German scientists!"

"Well," said Bill, "I'll tell you. The process of melting metals presents so many ramifications that even foundrymen, themselves, sometimes are puzzled. A man may be perfectly familiar with the peculiarities of one metal, but he will hesitate to tackle another. I had an inquiry recently from an iron foundryman who was up against the proposition of melting a heat of 3000 pounds of bronze in a cupola.

"Melting bronze in a cupola is not an impossible feat. Under stress of circumstances I have melted heats on several occasions. Many other men have melted bronze in the cupola and the practice is not modern by any means. When I was a boy serving my time, an old molder told me he remembered of seeing a heat of bronze melted in the cupola to pour an 8-foot propeller. 'Twas quite a job for the little shop and they had to prop an 8 x 8-inch timber under the end of the crane jib to prevent the crane from falling down when the ladle was hoisted. These old time molders were ingenious and resourceful lads. I am familiar with at least one foundry in this country where the bronze for water wheels always is melted in one of the cupolas.

"This foundryman I am telling you about wrote that he had a cupola lined to 42 inches in which he contemplated melting 3000 pounds of the bronze alloy known as 88-10-2, that is 88 per cent copper, 10 per cent tin and 2 per cent zinc. In his iron foundry practice he used 840 pounds of coke on the bed and a first charge of 1500 pounds of iron. The remaining charges are made up of 1000 pounds of iron with 100 pounds of coke between. The blast shows a pressure of 8 to 10 ounces. He wanted to know how to regulate his melting practice, the weight of the charges, the height of the bed, the blast pressure, the loss, if any, of the various elements and any other features that would assure satisfactory metal.

"With a good, hot furnace and ladle, a good grade of coke and a mild blast, he will have no trouble in melting 3000 pounds of bronze in his cupola. He can use the same height of bed as in melting iron. He can split the metal into two 1500-pound charges with 100 pounds of coke between them. The blast pressure should be reduced to between 3 and 4 ounces and this naturally will reduce the volume.

"Several methods are available for doing this, depending on the type of blower and blast pipe. The blower may be slowed down, the gate in the blast pipe may be closed part way, one or more of the small doors in the windbelt may be opened to allow part of the blast to escape instead of blowing into the cupola.

"Since this was to be his first attempt I advised him to watch everything closely. The metal melts more rapidly than iron, but this easily may

FROM *WILD WORDS AND WHERE TO FIND 'EM!*

be noted through the peepholes in the tuyeres. He did not give the height of the tuyeres above the sand bed, but, assuming that the cupola is of the fairly standardized type found in jobbing foundries, it will hold the entire 3000 pounds of metal in the well. If the tuyeres are exceptionally low, say less than 10 inches, he will have to take the metal out in two taps.

"Another point he overlooked was to state whether he intended to use virgin metal or scrap. The term scrap in this instance may mean an indiscriminate collection of broken parts, or, it may mean secondary metal in the form of ingots conforming to a definite analysis. A satisfactory mixture cannot be made by charging virgin copper, tin and zinc in the cupola after the manner used in charging different varieties of pig iron and scrap iron or steel. Copper, tin and zinc all melt at different temperatures. Most of the tin and zinc will volatilize and disappear up the stack before the copper is melted. The copper may be melted in the cupola and tapped into a waiting red hot ladle. The required amounts of tin and zinc may be melted in crucibles and added in that condition to the molten copper. Under other conditions, the tin and zinc are raised to a red heat in a fire or an iron pot and then placed in the copper bath. Under still other circumstances, where comparatively cold metal is required to pour a massive casting, all or nearly all the tin and zinc is placed in the bottom of the ladle and the molten copper is tapped on top of it.

"Assuming that he intends to charge the cupola either with scrap or ingot metal of the desired composition, he will have to add enough tin and zinc in the ladle to compensate for the amount that escapes up the stack. This amount is not as large as if the metals were melted independently. For a 3000-pound charge the loss will amount to about 30 pounds of zinc and 10 pounds of tin. This additional metal is not charged in the cupola. It is heated and placed in the bottom of the ladle and the metal from the cupola is tapped on top of it. The ladle is heated practically to a red heat in advance and this extra metal is placed in the bottom some time in advance of the tapping operation. A few shovels of charcoal also are placed in the ladle before the metal is tapped. Of course if wood is employed to heat the ladle, a sufficient amount of ash and charcoal will be present before the ladle is filled with metal. After the ladle has received all the metal from the cupola, a long green wood pole is introduced and stirred around. The boiling action helps to clear the metal of any occluded gases. Needless to say the pole must be introduced slowly and cautiously to prevent an explosion. Wear goggles and keep the head turned away.

"The melting zinc will give off dense white fumes that will fill the cupola and pour out of the top. Therefore he cannot look in the charging door to estimate the amount of metal at any stage of the melting period. He will have to watch through one of the tuyere peep holes and note how the metal is streaming down from the top and how it is rising

(*Concluded on Page* 1070)

WHAT OTHERS ARE THINKING

Abstracts Selected from the World's Foundry Literature

Adding Vanadium and Titanium

Vanadium and Titanium in Cast Iron, by J. E. Hurst, *Foundry Trade Journal*, London, Sept. 5, 1929..

Examination of results obtained by Piwowarsky shows that titanium acts similarly but more actively than silicon. Addition of up to 1 per cent or more of titanium is accompanied by definitely improved properties of irons high in silicon. Microscopical examination of the alloys showed a noticeable reduction in the size of the grains and graphite particles even when only small quantities of titanium were present. Titanium has an influence against the formation of a chill. Experiments on car wheel irons ordinarily showing a depth of 1½ inches showed only 1-inch chill when treated with titanium in the ladle. Titanium additions to malleable cast irons promote the formation of a fine structure in the casting before annealing. In the malleableized casting, the temper carbon was uniformly distributed in a fine state of division. Vanadium increases the tensile, transverse and compressive strengths of cast iron according to several investigators. Donaldson reports that 0.15 per cent in ordinary work increases the tensile strength by 7740 pounds per square inch, and a cast iron that had failed in a transverse test with a load of 1300 pounds, attained a load of 2200 pounds with the addition of 0.135 per cent vanadium. This material exercises a strong effect on the grain of cast iron causing a more even distribution of the graphite and gives freedom from porosity. In chilled castings vanadium tends to produce a deeper and stronger chill less likely to spall and flake. Vanadium iron takes on a high finish on machining and tooling, and has been used successfully in making glass bottle molds, blanks and plungers.

Heat Treating Gray Iron

Influence of Heat Treatment on Gray Cast Iron, by M. Godefroid, *La Revue de Fonderie Moderne*, Paris, July 25, 1929.

In defining gray cast iron, the author emphasizes the importance of the operation of the cupola to obtain good quality iron. In many cases costly additions are not necessary if the cupola is operated properly. The author has investigated especially the heat treatment of cast iron. In a first series of experiments he has found that ordinary gray cast iron readily responds to heat treatment, but this treatment is more delicate than in the case of steel. The treatment modifies the structure of the iron and has a marked influence on the formation of the graphite. To soften cast iron before machining, reheating at a low temperature is recommended.

In a second series of experiments, the author has studied the influence of the various constituents of the iron in the course of the heat treatment. The present article gives the result pertaining to silicon, nickel, manganese and chromium. This has enabled the author to state in his conclusions that it will be possible to foresee certain compositions of cast iron which, when submitted to the proper heat treatment, will answer to certain specific industrial requirements. Special mention is made of the application of these results to precision castings, the machining of castings and high duty cast iron.

Describes German Foundry School

Foundry Studies at the Foundry Institute of Aachen, Germany, by Professor Piwowarski. *Bulletin* of the Belgian Foundry association, Brussels, October, 1929.

The institute is divided into three sections: one for the study of the metallurgy of iron, one for the study of the metallurgy of nonferrous metals, and one for foundry study. The students only begin specializing during the last year, the course of studies lasting three years. Special courses are given on metallography, the testing of foundry sands, the study of the cupola and of drying ovens, and the computation of cupola charges. The limited space of the foundry enables only certain types of castings to be made. A course also is given for the establishment of production costs.

Apart from the courses delivered to the students, the institute is used for research work, and the article briefly describes what has been done up to the present time. Researches have been made to obtain improvement of the qualities of cast iron, and many experiments have been undertaken on superheated cast iron. A study of the expansion of cast iron has brought investigators to the conclusion that the effect of superheating cast iron is to divide the graphite into fine particles, and that this tends to decrease the expansion. It also has been found that by replacing part of the silicon by nickel, good effects from the point of view of expansion have been obtained.

Investigations have been made covering the corrosion of cast iron by acid and bases, and it also has been found that the addition of nickel has a favorable influence. Studies also have been made on the porosity of cast iron, and investigators have arrived at the conclusion that this porosity is more due to cracks and defects than to the microscopic structure of the iron. It has been found that cast iron melted at a high temperature absorbs partically no oxygen. With regard to malleable cast iron, investigations have been made regarding the addition of nickel and chrome, and also the means of reducing the period of heating and cooling.

Studies recently have been commenced in the nonferrous metal field. With regard to steel castings, investigations are being made on the influence of manganese, nickel, chrome, and molybdenum. A study of the operation of the cupola has shown that the temperature of the cast iron and the tonnage melted per hour increased with the volume of the blast. The question of testing and researches on foundry sand are being undertaken.

It is pointed out in the paper that the Vereinigte Stahlkerke, Germany, is testing high-pressure tubes made in iron in which additions of nickel and chrome have been made, and they also are testing rails made in special cast iron. The different properties of foundry cast irons having the same chemical composition also are being studied, under the instigation of the Verein Deutscher Eisengiessereien.

Determines Manganese in Steel

Determination of Manganese in High Chromium Steels, Iron and Steel Industry, London, November, 1929.

Manganese may be determined accurately in the presence of high chromium by a modification of the Ford and Williams chlorate method, as follows: Dissolve 2 grams of the sample in 50 cubic centimeters of 1-1 hydrochloric acid. After the solution is complete, boil and add 10 cubic centimeters concentrated nitric acid and evaporate to dryness. After evaporation, cool, add 10 cubic centimeters concentrated nitric acid and again evaporate to dryness, being sure to eliminate all traces of hydrochloric acid. Cool and add 25 cubic centimeters concentrated nitric acid and about 3 grams of potassium chlorate. Boil until hydrated manganic oxide separates from the solution and continue to boil for several minutes. Cool and filter through a thoroughly washed asbestos pad connected to a filter pump. Dissolve the precipitate from the pad with hot dilute hydrochloric acid and wash thoroughly. Add 15 cubic centimeters concentrated sulphuric acid to the solution and evaporate to dense white fumes. Cool and add 50 cubic centimeters dilute nitric acid and allow the solution to become perfectly cold. Add sodium bismuthate, filter and titrate with standard ferrous sulphate and potassium permanganate as in the bismuthate method.

For reasonably accurate results, the method may be modified by transferring the precipitate on the filter pad to a flask and dissolving in a measured amount of standard ferrous sulphate and titrating the excess with standard potassium permanganate as before. This method is the quickest of the two but is not quite as accurate as the former method. These methods attempt to overcome the difficulties of dissolving the sample and obtaining a suitable solution for estimation and the elimination of interference by chromium.

The Shakeout

DAN M. AVEY, *Editor*
FRANK G. STEINEBACH, *Managing Editor*
PAT DWYER, *Engineering Editor*
EDWIN BREMER, *Metallurgical Editor*
CHARLES VICKERS, *Nonferrous Editor*
NORMAN F. HINDLE, *Assistant Editor*

¶ Bet You a Million—Henry

HENRY FORD probably has few equals and no superiors as an industrialist. Further, he has been singularly successful in using that powerful modern force, known as publicity. Witness, his wage advance announcement tuned in to catch the public ear at the recent Hoover conference on restoring confidence. On a basis of performance in manufacturing and this and that, we might say Henry bats 300 per cent, but as a prophet the box score shows that he boots many easy outs, and can't see a fly ball for the sun.

MANY recall his advertisements of the Model A which appeared a few months ago in which it was announced that positively no malleable castings would be used. Don't know exactly what made him muff that one and resort to stampings and forgings so that he could make good on that prophecy, but the Model A soon returned to malleables and has been using more than 40 pounds of malleable castings on each passenger model. And now witness the following:

Nov. 15, 1929
NEW YORK EVENING POST. F
HENRY FORD TALKS FUTURES
By HENRY FORD
In Collaboration With Samuel Crowther
Electricity, by providing a new motive power, has profoundly changed manu-
Abolishing the Foundry
With the new electrical method we have abolished the foundry, except for the making of the cylinder block, and it will be only a question of time before the foundry will have passed out of nearly all industry.

Mr. Ford, in collaboration with Samuel Crowther, says: "With the new electrical method we have abolished the foundry, except for the making of the cylinder block and it will only be a question of time before the foundry will have passed out of nearly all industry."

Perhaps Henry was quoted in error. If not, we believe he will miss another prophecy. In fact we'd like to bet Henry a million that a hundred years from now castings still will be demanded, not only for the uses they now fill so well, but for many others, as yet unknown. Further, we would be willing to bet that even the forthcoming year will see castings used for many purposes in the Ford car, other than in the cylinders alone. Anyway, why pick on the foundry industry, Henry?

¶ Thunder Off Stage

EVERY speaker appearing in public for the past several weeks has referred to the earthquake on Wall Street and the resulting casualties. Whether this reference was the bleat of the shorn lamb, the ponderous judgment of an expert, or the comical story about "them two fellows," the stock market recession has afforded food for gossip. Anyone who knows the ability and foresight of the man would hesitate to question the judgment of President Hoover in instituting a series of conferences designed to restore confidence. However, the multiplicity of "huddles" which have followed seem to have passed the point of useful attainment. Are we not talking reassurance to the point of too much reiteration, too many affirmative statements on confidence?

FIRST came the Washington meetings, affording news features and publicity opportunities to leading industrialists. Then a few politically minded governors started minor huddles, and now comes the procession of minor public officials and local captains of industry with broad promises of expenditures to bolster up public confidence. Pictures of the conferees all freely available to the press, of course.

AFTER all, isn't this rather far fetched? No housewife has turned off the gas under the family hash because public utility stocks are down. Few cars have been hoisted on jacks to await the turn of the market in automotive stocks. The same millions of roadside pumps stand ready to deliver, although some amateur plungers have lost their paper profits and their $13.12 cash margin on oils. But the danger lies in too much emphasis on the importance of security prices. The confidence conferences also may bring about as a secondary move, a drive to reduce prices on commodities, to assist the big buying interests in increasing their operations. This most certainly is no time to bolster confidence by depressing prices and foundrymen should view with keen questioning reported price cutting of competitors, as reported by inquiring buyers of castings.

Comings and Goings of Foundrymen

Men of the Industry, Whose Activities Are Making Foundry History

FRED MAPLE, formerly foundry superintendent of the Alliance, O., plant, American Steel Foundries, and more recently at the Chester, Pa., works of the company, has been appointed shop superintendent of the Verona works of the company.

C. K. Charlton has been appointed superintendent of foundries of the Bucyrus-Erie Co., Milwaukee.

Albert E. Edwards, formerly connected with Nichols & Shepard Co., Battle Creek, Mich., has taken a position with the Chevrolet division of the General Motors Co.

Gilbert Polen, formerly foreman in the cleaning and finishing department of the Alliance works of the American Steel Foundries, has been transferred to the Verona, Pa., works of the company as foreman in the same department.

E. E. Griest, general superintendent, Chicago Railway Equipment Co., addressed the December meeting of the Chicago Foundrymen's club at the City club, Chicago, Dec. 5. Mr. Griest discussed practical foundry research.

J. Leonard, past-president of the association, chief engineer of Societe Angleur-Athus, has been elected president of the Association Technique de Fonderie of Belgium, succeeding Marcel Remy, who has tendered his resignation.

James T. Mackenzie, chief chemist and metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., addressed the regular December meeting of the Quad-City Foundrymen's association on Dec. 2. Mr. McKenzie's subject dealt with various foundry practices.

Fred Grotts, superintendent of wheel production, Granite City, Ill., plant, American Steel Foundries, recently addressed the St. Louis Car Foreman's association on the history and the production of the steel wheel invented by James C. Davis, formerly vice president in charge of operations of the company.

H. C. Wheeler, plant engineer, American Steel Foundries, Alliance, O., has been named head of a new department to manufacture steel car wheels. New equipment costing $99,000 is to be housed in a building now being erected at a cost of $60,000. It is expected that it will be ready for operation Jan. 15.

Albert W. Ritter, casting supervisor, Stanley Rule & Level division, Stanley Works, and identified with the

The Foundry To Present Series Covering General Foundry Practice

EVERY phase of activity in the practical operation of a foundry is discussed in a series of articles on foundry practice, the first of which will appear in the Jan. 1, 1930, issue of THE FOUNDRY. *The author, Ivan Lamoureux, is a noted Belgian and internationally known. He comes from a long line of foundrymen, prominent in the industrial life of his native land. Previous to the war he was joint owner with his brothers and managing director of a foundry company known under the title of Lamoureux Freres. Following the war, which claimed the lives of his two brothers and resulted in the destruction of the foundry, he began the manufacture of foundry equipment, and still is engaged in that business. He has taken an active part in the work of the Belgian foundry association and has presented several exchange papers before other foundry groups. He was the author of the exchange paper "Chaplets in Heavy Iron Castings" presented*

at the Detroit convention of the A. F. A. in 1926.

While this series of articles was written primarily for the instruction of students attending the Institut de Fonderie, Liege, the fact that the methods, equipment and materials employed in Belgian foundries differ from those in the United States in only a few unimportant details makes the work of great value to American foundrymen. In fact, the fundamental principles involved in the production of castings are the same in every country, so that this series of articles on foundry practice will be interesting and instructive to readers of THE FOUNDRY *in every land.*

The author has divided his subject into six sections. The first section deals with sands and includes information on composition, physical characteristics, varieties, storage, methods of tempering, equipment, etc. The remaining sections are devoted to elements of molding, typical jobs in green sand, examples of highly skilled work, cores, melting and metal. The entire presentation is set forth in logical sequence and in an exceedingly interesting manner.

plant for 17 years, retired from that position Dec. 1. He was succeeded by Joseph Hance, formerly assistant to E. V. Higbee, superintendent. Mr. Hance has been with the company 27 years.

William K. Farrell has been appointed general purchasing agent for the American Locomotive Co., 30 Church street, New York.

Lists Pattern Standards

Pursuant to a request from the fifth annual conference of the California Development association held at Del Monte, Calif., Jan. 24, and with the approval of the American Foundrymen's association, the department of commerce, Washington, has submitted for the approval of the industry certain recommended standards for foundry patterns of wood. The recommended standards are sponsored by the foundrymen's association and are to become effective on acceptance. They deal with standard pattern colors and are as follows: Surfaces to be left unfinished are to be painted black; surfaces to be machined are to be painted red; seats of and for loose pieces are to be red stripes on a yellow background; core prints and seats for loose core prints are to be painted yellow; and stop-offs are to be indicated by diagonal black stripes on a yellow base.

Bill Melts Bronze Heat

(*Concluded from Page* 1066)

in the well. When this stops he will know all the metal is melted and should be tapped immediately.

"Perhaps he is doing it already for the iron, but if not I suggested he proceed as follows: Place a 6-inch length of 1-inch stock core in the tap hole before starting the blower. Dry the spout with a wood fire or with a torch instead of depending on the flame from the tap hole. The core should fit fairly tight and a little smear of clay around the outer and will prevent any metal leakage.

"Composition of the metal may vary within recognized limits without impairing its value. Thus the copper may range from 86 to 89 per cent, the tin from 9 to 11 per cent and the zinc from 1 to 3 per cent. Lead may be present up to a maximum of 0.20 per cent and a maximum iron content of 0.06 per cent is tolerated. Good castings made from this metal should show the following minima in physical characteristics: Ultimate strength, 30,000 pounds per square inch; yield point, 15,000 pounds per square inch; elongation in 2 inches, 14 per cent."

A.F.A. Plans Apprentice Training Session

At a meeting of the apprentice training committee of the American Foundrymen's association held in Chicago, plans were formulated for the apprentice training sessions and contests to be held at the 1930 convention of the society in Cleveland. The meeting was held at the offices of the American Foundrymen's association and seven of the committee were present. These members were: C. J. Freund, Falk Corp., Milwaukee, chairman; R. E. Kennedy, American Foundrymen's association, secretary; G. E. Bergstrom, Chicago; J. Grennan, University of Michigan, Ann Arbor, Mich.; J. H. Ploehn, French & Hecht, Davenport, Ia.; F. W. Kirby, John Deere Spreader Works, East Moline, Ill., and G. P. Singer, Reading Steel Casting Co., Reading, Pa.

S. W. Utley, Detroit Steel Casting Co., Detroit and E. H. Ballard, General Electric Co., West Lynn, Mass., will speak at the session on apprentice training at the annual convention in Cleveland in May. Several revisions of the regulations governing the pattern making contest were approved by the committee. A drawing was selected for use in the pattern making contest and a pattern was selected for the casting to be used in the steel and iron molding contests. Notice of these contests will be sent to interested organizations.

Local and district contests are held under the auspices and regulations of the A. F. A. and are open only to apprentices regularly indentured and not over 24 years old. Copies of the regulations may be obtained by addressing the American Foundrymen's association, 222 West Adams street, Chicago. A display of apprentice training material in addition to the apprentice contest exhibit will be held at the coming convention.

Making Implements

(*Concluded from Page* 1063)

used, using two drop machines on which the patterns are mounted, the machines being attached and moving with the sandslinger.

A floor space of 40 x 200 feet is required to handle a daily production of 92 cases, which are molded and poured in about ten hours. There is a roller conveyor system extending from the core room, passing the full length of the molding floor and into the mill room, the conveyor being used for handling of cores on the floor and for taking the castings into the mill room for the necessary operations.

Fig. 26 shows the setting of the cores on this job, while Fig. 24 shows the closing of the mold. The rough casting weighs approximately 850 pounds, while the finished casting weighs 725 pounds. The size of the flask, when closed, is 37 x 70 x 30 inches, inside measurment. The flask weighs about 2300 pounds and the bottom plate about 1100 pounds. The weight of sand required to complete the mold is 3600 pounds.

For the molding of the rear axle housing such as shown in Fig. 28 a sand slinging machine is used, using a roll-over machine for the drag and a drop machine for the cope. These machines are attached and move with the sand slinging machine. A crew of ten men are used to mold and pour.

A floor space of 30 x 150 feet is required to handle a daily production of 150 to 175 castings in approximately ten hours. The rough casting weighs approximately 160 pounds, while the finished casting weighs 125 pounds. The weight of sand required in the complete mold is 1100 pounds. Fig. 29 shows the molding on this job, Fig. 27 shows the floor and the pouring of some of these castings.

It is necessary to watch the quality of the molding sand quite carefully. Tests continually are being made upon each heap of sand in the foundry and the moisture, permeability, and strength of the sand are kept within relatively narrow limits. This is quite essential on production work. The standard A. F. A. tests are used.

Send Greetings to English Founders

Members of the American Foundrymen's association delegation to the third International Foundrymen's congress have banded together in sending a greeting to the various foundrymen's associations in England thanking them for the kindness, hospitality, courtesy and entertainment accorded them during their visit to that country.

The text of the greeting is as follows: To the Institute of British Foundrymen, the Foundry Trades Equipment and Supplies association, Ltd., the officers and directors of these associations, the local branches throughout England and Scotland, members and friends—Greetings: We, the members of the American Foundrymen's association delegation to the third International Foundrymen's congress representing the foundry industry in America, hereby individually express and collectively record our deep appreciation for your kindness, hospitality, courtly courtesy, and entertainment. For many, last summer's

visit to your land represented the renewal of former pleasant contacts. For others, this was first acquaintance. All of us now are united in a bond of pleasant recollections sustained by the hope and anticipated pleasure of retaining your friendship through the years to come.

This greeting is printed on the outside of the four page folder and the two inner pages contain the signatures of the members of the party.

Molds Steam Table

(*Concluded from Page* 1058)

at the opposite end of the mold.

Upright gate sticks were placed to feed the gates in the cores. Cinders were packed against the ends of the pipes to permit expansion and sand was rammed in the space between the end cores and the end of the iron casing. About half way to the top, the continuity of the various upright gates was broken by a short horizontal jog designed to check the speed of the falling iron. This part of the gate was covered with a slab core.

Cover cores were placed over the open mold and these were held down by a cope resting on the side plates. The gate sticks and risers were placed in their respective openings and the chaplets *H*, Fig. 1, were adjusted. The cope then was filled with rammed sand. The upper tie rods were tightened. The weights were placed, chaplets wedged and the runners and risers made up. Flowoff channels were arranged in case it became necessary to run any iron through. However, the metal rose perfectly quiet in the risers and it was not necessary to run any iron through them. The casting was fed through two risers for a short time after it was poured.

Four ladles were employed to pour the casting. A bottom pour ladle was mounted over the runner basin at each end and this was supplemented by the regular tilting crane ladles. The stream from the tilting ladles was regulated so that the stationary ladles were emptied first. Excess metal carried in the crane ladles as a precautionary measure, was poured into other molds.

The casting was stripped after four days and removed from the mold. I was asked several times for my opinion on the probable result of using such a large metal insert. The cupola charge was made up of all No. 2X pig iron and this gave what might be termed a stretchy iron in the casting and an iron that would contract and shink to a minimum extent. Further, an annealing and normalizing effect was secured by leaving the casting remain in the sand for four days. A compressed air jet readily removed the sand from the tubes. The entire time for chipping and cleaning did not exceed three hours.

Study Material Control and Storekeeping

The bureau of business research, college of commerce and administration, Ohio State university, recently has issued a 284-page mimeograph bulletin on a study of material control and storekeeping in foundries and machine shops. The majority of the data is devoted to machine shop control, only two sections of the bulletin being devoted to foundry study. The book contains many illustrations of cards and tickets used in that type work and shows the flow of material under various classifications. Chapter XI appears to be of the most interest to foundrymen. In that section, pattern and storage control, molding floor materials, flask control, molding floor supplies, materials used in casting, core room, cleaning room and allocation of material costs are discussed. The bulletin is available to residents of Ohio for $1.50, all others $2.50 and may be obtained by addressing bureau of business research, Ohio State university, Columbus, O.

Newark Group Meets

Members of the Newark Foundrymen's association held their December meeting at the Downtown club, Newark, N. J., Dec. 11. There was an informal discussion of various foundry problems, with H. G. Specht, general manager, Eastwood Wire Corp., Bellville, N. J., serving as chairman. Subjects included labor control, scrap control, and labor saving equipment. Mr. Specht was assisted by F. E. Campbell, Eastern Steel Castings Co., Newark. Those who were scheduled to participate in the discussion were: George Dieseroth, General Electric Co., Elizabeth, N. J., R. E. Moore, Flockhart Foundry Co., Newark; David MacIntosh, Sacks-Barlow Foundries Inc., Newark; A. H. Howell, Somerville, N. J.; and J. H. Reitzel, Eastern Steel Castings Co., Newark.

To Revise Standard

Committee D-5 on coal and coke of the American Society for Testing Materials is revising the present standard foundry coke specification of the society. The committee recognizes that different grades of foundry coke are available and that physical properties as well as chemical analysis affect its performance in the cupola. One specification under consideration does not give any limits of chemical composition but gives percentage tolerances allowable for any specified composition agreed upon by buyer and seller. Another form of specification being considered is one based on definite limits of chemical composition and physical properties for different grades of coke available for foundry use. The committee also reports progress in the development of a laboratory test for determination of pulverizing characteristics of coal for preparation of powdered coal. Recently a new subcommittee was formed to prepare standard methods for sampling coke for analysis. Such methods are to supplement the present standard method of sampling coal of the society.

Wisconsin Foundrymen Study Test Bars

About 70 foundrymen from the Milwaukee district attended a meeting of the Wisconsin Gray Iron Foundry group at the Schroeder hotel, Milwaukee, Dec. 4. This group which is affiliated with the department of metallurgy of the University of Wisconsin, Madison, Wis., has been carrying on interesting investigational work on gray iron test bars. Prof. R. S. McCaffery presided. Dan M. Avey, editor, THE FOUNDRY, Cleveland, spoke on business conditions and present problems connected with the gray iron branch of the foundry industry.

W. F. Bornfleth, Cream City Foundry Co., Milwaukee, a member of the steering committee, under the group's informal organization, reported on program plans which practically have been completed for the present season. Prof. Scott Mackay, University of Wisconsin, reported progress on testing cast bars by members of the group and his plan to establish a committee on sands in the near future.

Hold December Meeting

A paper entitled "The Metallurgical Advantage of High Melting Speed" was presented before the Philadelphia Foundrymen's Association Inc., Philadelphia, Wednesday evening, Dec. 11, at the Manufacturers club. The speaker was W. N. Truxell, research engineer, Potter Coal & Coke Co., Greensburg, Pa.

Determination of manganese in steel and iron by the persulphate-arsenite methods is described in research paper No. 109 recently published by the bureau of standards. Copies may be obtained from the superintendent of documents, Washington, for 5 cents.

Prospects Bright For 1930

Men of Industry Look for at Least Normal Castings Business for First Six Months—Stock Market Crash Fails To Rock Foundry Ship

THE stock market crash, the leading topic of conversation during the past two months, has failed to dislodge the foundry industry from the stable foundation of prosperity established during the first nine months of 1929. On the whole, foundry operations are equal to or better than the rate recorded during the closing days of 1928, and leaders in practically all phases of the industry see better business ahead in the early part of 1930. Some predict that production during the coming six months will exceed the output during the corresponding period of 1929, when the demand for castings was exceedingly brisk.

This information was revealed in startling clarity through a survey of all branches of the industry just completed. The survey was undertaken to secure a cross section of business conditions and was contained in the report of Fred Erb, who was called upon to represent the industry as president of the American Foundrymen's association. This was presented at the conference of trade associations of iron, steel, nonferrous metal and allied industries, held in Washington, Dec. 5. This survey was conducted by THE FOUNDRY at the request of Mr. Erb and the information was secured through the co-operation of the American Foundrymen's association, the Gray Iron institute, Malleable Iron Research institute, Steel Founders' Society of America, National Metal Trades association, numerous local groups and many individual foundrymen in various districts and representing all leading lines of manufacture.

Production Higher Than Last Year

Current rate of production of steel castings is above the rate last year, and present conditions are better than any month in 1929. Bookings for the last six months have been about 72 per cent of capacity, an increase of about 19 per cent over the same period last year, and production increased 25 per cent in the same period. The outlook is fairly good and shops are optimistic concerning the opportunity during the first six months of next year. Railway buying is considered an important factor and many foundries which make railway specialties probably will be busy.

Orders on hand for general railway car castings are four times as great as they were a year ago. The first half of 1930 presents encouraging prospects, but it is doubtful if that period will equal the corresponding period in 1929. Operations of larger steel foundries in the Pittsburgh district are equal to or better than the rate a year ago, with the outlook correspondingly good. The activity is due entirely to the demand for freight car and heavy machinery. Steel roll and rolling mill machinery demand has decreased in the past few weeks, matching the decline in steel mill operations, although backlogs are larger than a year ago and insure full operation through the first quarter of 1930. A marked increase in orders for shop steel castings has been noted in the past two months and production expectations for the next three months are good. Steel plants in the Chicago territory report better business than a year ago, even considering the pickup during December, 1928.

Business in the gray iron industry has shown a slight decline over the same period last year, due to a slackness in several industries requiring large tonnages of gray iron castings, such as the automobile industry, the construction industry and to a less extent the radio industry. If these industries were operated at the normal rate, operations of gray iron foundries would show a marked increase over business in the latter part of 1928. Foundries producing equipment for railroads and allied lines are fairly active.

A large manufacturer of agricultural implements is operating only slightly below a year ago and anticipates operations to continue steadily on this basis for the next six months. A large jobbing shop in the Chicago district, while not operating at capacity, reports business considerably better than a year ago. Jobbing shops and stove plants in the St. Louis district are about 10 per cent lower this month than they were in December, 1928, and estimate business for the first half of 1930 at about 20 per cent lower than in 1929. In New England, operations are about the same as they were last year, with a normal output anticipated for the first six months of the new year. General jobbing operations in the vicinity of New York have dropped about 20 per cent in the past month, bringing operations to 60 to 65 per cent of capacity. However, better than normal business is anticipated for the first half of 1930. Operations in the Milwaukee district, on the whole, are slightly below normal, but an increase in orders already has appeared.

Current operations in cast iron radiator plants are better than during the corresponding period last year, but more stock in finished radiators is being carried at this time. The past year has been a record year for radiator companies, and it is expected these foundries will be slightly less active during the early part of 1930. A large firm making general compressor and pump equipment states that November was the best month in its history, and even better business is anticipated in the near future. Cast iron pipe business is below last year's average at this time, but manufacturers expect an increase in business over the early part of 1929.

Malleable Plants Operate at 60 Per Cent

Production of malleable castings in October was 63 per cent of practical capacity, and in November, based on incomplete returns, is estimated at 60 per cent, as compared with 68 and 67 per cent in the corresponding months a year ago. However, the production in 1929 exceeded the output in 1928 by about 5 per cent. Prospects for the coming year are considered reasonably good as far as railroad and miscellaneous jobbing castings are concerned. Prospects for automobile demand are directly dependent upon the activity in that industry, which probably will be difficult to estimate until the various shows are held in January and the attitude of car buyers toward additional purchases is ascertained. Manufacturers of malleable castings feel reasonably certain that the volume of business for the first half of 1930 will closely approach normal, basing this prediction in part on an increased tonnage of railroad malleable, approximately normal volume of miscellaneous jobbing work and automotive work somewhat below normal.

Business in the brass foundry industry is not as good as it was in December, 1928. A leading brass foundryman has the following to say regarding the situation: "A noticeable recession in volume was apparent early in August and a gradual recession has been evident since that time. This is particularly true of those foundries supplying brass, aluminum and other nonferrous castings to the automotive industry. The foundries catering to the building and construction industry, such as manufacturers of plumbers' supplies, steel fitting supplies, etc., have been only reasonably prosperous during the entire year. Many have felt competition very keenly, while others have found satisfactory volumes at profitable prices."

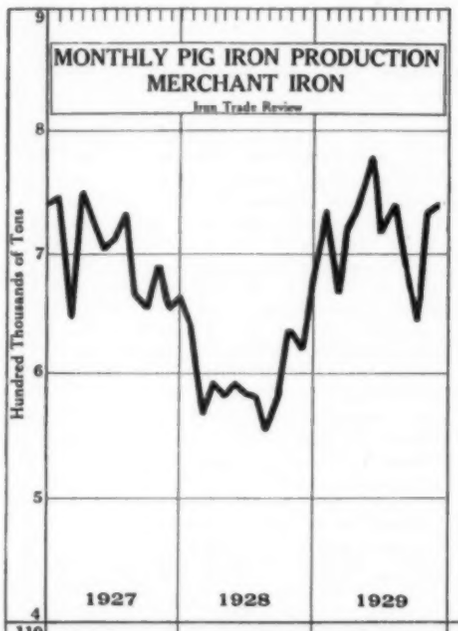
It is pointed out further that if the automotive industry starts the New Year with considerable optimism and lays down schedules that are approximate to previous years' schedules, foundries making castings for that industry will be busy for the early part of the year at least. Those foundries supplying castings for the construction and building industry will prosper without question if the contemplated expansion in building operations is carried through. The picture in the nonferrous casting industry is brightened considerably by the possibility of substantial purchases by the steel industry and the railroads.

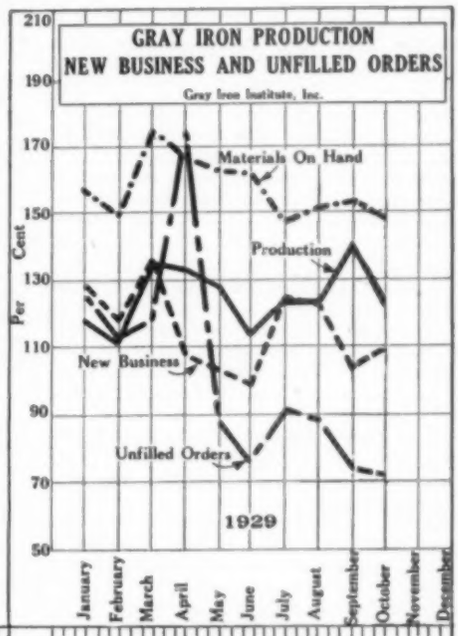
One nonferrous foundryman believes that the lack of confidence on the part of buyers of nonferrous castings has postponed many orders that these foundries might otherwise have on their books today. He attributes this lack of confidence partly to a feeling that the price of copper at 18 cents per pound is an artificial one. It is pointed out that buyers see a possibility of this price being reduced, resulting in lower quotations for castings, provided, of course, the buyers wait long enough. It is possible that in the advent of an increase in the demand for copper, it will reduce the available supply and consequently stiffen the demand for red metal. This in turn should react to increase confidence in the present price of metal, resulting in the placing of orders that now are held in abeyance, hoping for a drop in the price of copper. This foundryman believes that the price of 18 cents is artificial and is out of proportion to the cost of production in a large number of the bigger producers. A reasonable reduction in the price of copper might stimulate buying of bronzes and

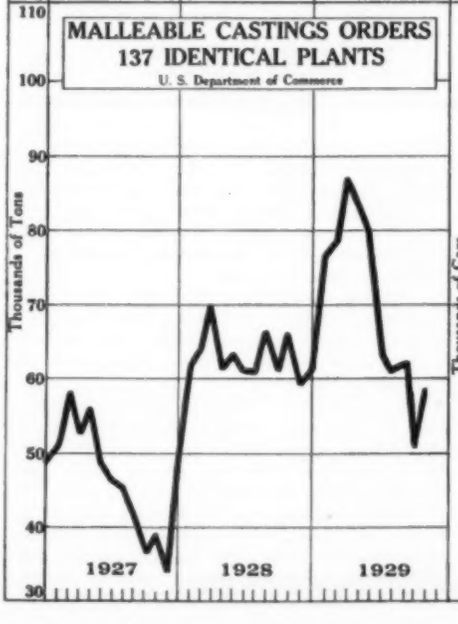
RAW MATERIAL PRICES

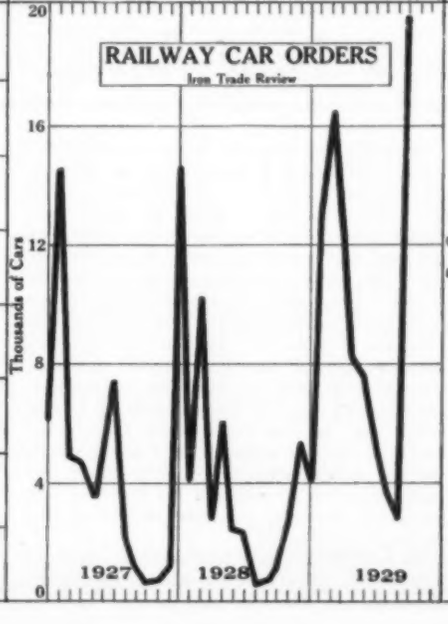
Dec. 5, 1929

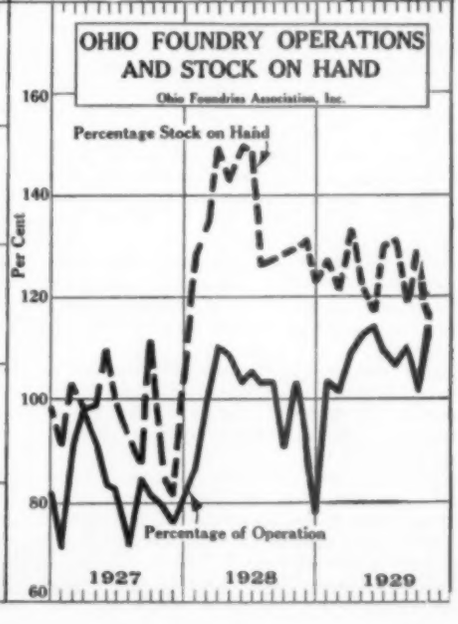
Iron	
No. 2 foundry, Valley	$18.50
No. 2 Southern, Birmingham	14.50
No. 2 foundry, Chicago	20.00
No. 2 foundry, Philadelphia	21.76
No. 2 foundry, Buffalo	19.50
Basic, Valley	18.50
Basic, Buffalo	18.50
Malleable, Chicago	20.00
Malleable, Buffalo	20.00
Coke	
Connellsville beehive coke	$3.50 to 4.85
Wise county beehive coke	4.25 to 5.00
Detroit by-product coke	8.50 to 9.00
Scrap	
Heavy melting steel, Valley	$15.00 to 15.50
Heavy melting steel, Pitts.	15.00 to 15.50
Heavy melting steel, Chicago	12.50 to 13.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Chicago	10.25 to 10.75
No. 1 cast, New York	10.50 to 11.00
No. 1 cast, Chicago	14.00 to 14.50
No. 1 cast, Philadelphia	16.00
No. 1 cast, Pittsburgh	14.50 to 15.00
No. 1 cast, Birmingham	12.00 to 13.00
Car wheels, iron, Pittsburgh	14.50 to 15.00
Car wheels, iron, Chicago	13.25 to 13.75
Railroad malleable, Chicago	15.50 to 16.00
Agricultural mal., Chicago	13.75 to 14.25
Malleable, Buffalo	17.00 to 17.50
Nonferrous Metals	**Cents per pound**
Casting, copper, refinery	16.75
Electro, copper, producers	18.00
Straits tin	38.37½
Lead, New York	6.25
Antimony, New York	8.37½ to 8.50
Nickel, electro	35.00
Aluminum, No. 12, producers	23.00
Aluminum, No. 12, remelt	16.25 to 16.50
Zinc, East St. Louis, Ill.	5.95 to 6.00











brasses, in which copper is used as the major element.

A large association with membership in various branches of the metalworking industry, has canvassed its membership to determine the general business situation. Of the foundries replying, 35 per cent reported business better than a year ago, 31 per cent stated that it was approximately the same, and 34 per cent are operating at a lower rate. Of those reporting that business is better than a year ago, 37 per cent expect better business during the next six months, 42 per cent believe that operations will remain about the same, and 21 per cent are looking for a drop in production. Forty-one per cent of the foundries which are operating at the same rate today as a year ago anticipate better business in the first half of 1930, 46 per cent predict a continuation at the same level, and 13 per cent see a drop in tonnage. Approximately half of the group operating at a lower level than in the latter part of 1928 believe that business is going to pick up in the next six months. Numerous plant expansion programs are reported.

What the Foundries Are Doing

Reflecting the Activities of the Gray Iron, Malleable, Steel and Brass Shops

Green Foundry & Machine Co., Detroit, has changed its name to Garland Foundry Co. and has increased its capital from $1000 to $4000.

Riverside Foundry & Machine Works Inc., Palatka, Fla., has been incorporated by M. Drennan Jr. and T. B. Dowda.

Mueller Brass Co., Lapear avenue, Port Huron, Mich., contemplates the construction of a 1-story plant addition.

Duroflex Piston Mfg. Co., Inc., Dallas, Tex., has been incorporated with $150,000 capital, by Lewis M. Manley, 3212 Bowen street.

Allen Mfg. Co., Nashville, Tenn., has received bids on its $200,000 stove plant which will include a foundry building 121 x 663 feet. (Noted Oct. 15.)

Minneapolis-Moline Power Implement Co., Minneapolis, has taken over the business and assets of the Minneapolis Steel & Machinery Co. W. C. Rich is secretary of the company.

C. J. Sternaman has opened the Sternaman Pattern Shop, Flora, Ill., for the manufacture of brass and aluminum pattern castings.

Fire recently damaged the plant of the Homer Furnace Co., Coldwater, Mich., with an estimated loss of about $500,000. The company has plans for rebuilding.

Fremont Foundry & Bearing Works, Oklahoma City, Okla., is preparing plans for a cast iron foundry at Trenton street and Frisco railroad.

The plant of the Capitol Brass Works, Parkdale avenue, Ottawa, Ont., was damaged by fire with a loss of $15,000. Owners propose to rebuild.

Glamorgan Pipe & Foundry Co., Lynchburg, Va., has changed its charter from 60,000 shares of no par value stock to 60,000 at $10 per share par value.

Levering Bros., Broadway avenue and Western Maryland railroad, Hanover, Pa., will take bids on the general contract for a foundry and warehouse about April, 1930. (Noted Oct. 15.)

Evansville Malleable Castings Co., 2549 Colm street, Evansville, Ind., had plans prepared for the construction of a 1-story addition estimated to cost about $30,000. L. P. Edwards is manager.

Detroit Stoker Co., General Motors building, Detroit, awarded a contract for a 1-story addition to its plant at Monroe, Mich., to the Austin Co., General Motors building, Detroit. (Noted Oct. 1.)

Levering Bros., 200 Key highway, Baltimore, has abandoned its Key highway plant and has moved the operations to a plant at Wiconico and Monroe streets. The old plant had been in operation for 117 years.

G. N. Ferguson Inc., Newark, N. J., has been incorporated with 2500 shares of common stock to engage in the foundry business, by Joseph L. Smith, attorney, 763 Broad street, Newark.

Robertson Lead Mfg. Co., Ltd., Montreal, Que., has been incorporated to manufacture and deal in steel, wrought iron, cast iron pipe and castings with $1,500,000 capital, by George G. Hyde, John G. Ahern and Paul H. Smith, all of Montreal.

Stockholders of the Sterling Range & Foundry Corp. and Co-operative Foundry Corp., both stove manufacturers of Rochester, N. Y., will be asked to approve a merger of the two companies under the name the Sterling-Red Cross Co. Merger to be effective Jan. 1, 1930.

Milwaukee Die Casting Co., 476 Fourth street, Milwaukee, has purchased a 4-acre tract of land in an industrial district along Richards street, but is not ready to announce plans for new construction. Henry F. Schroeder is president.

Florence Stove Co., Gardner, Mass., manufacturer of oil-stoves, recently acquired the E-Z-est Way Stove Works, Kankakee, Ill. W. L. Cooper, formerly with Kankakee plant, is in charge of manufacturing operations for both plants, with headquarters in Boston.

Springfield Bronze & Aluminum Co., Springfield, Mass., is building an addition which will contain a new office, chemical and physical testing laboratory, pattern shop and will increase the molding space 40 per cent. A separate building now under construction will house a fireproof pattern storage and space for raw materials. Contract for the job has been let to the Austin Co., Cleveland.

Sloan Valve Co., 4300 West Lake street, Chicago, has started the construction of a 3-story addition, 124 x 135 feet. Plans for the addition have been drawn by Alfred S. Alschuler, Chicago. Completion is scheduled for April 1, 1930.

Cochrane Brass Foundry, Boll's avenue, York, Pa., John H. Cochrane, owner, has built an addition, 40 x 60 feet, to the main foundry building, which now is 60 x 120 feet. A core room separate from the other building 25 x 50 feet also has been built. The following equipment also has been purchased: Air compressor, tank, motor and 5-ton traveling crane, J. T. McCabe, Philadelphia; jolt and squeeze molding machines, Adams Co., Dubuque, Ia.; core oven, Monarch Engineering Co., Baltimore, Md.; blower type heating plant, Lennox Furnace Co., Marshalltown, Ia.; motor-driven grinder, Marschke Mfg. Co., Towson, Md.; scales, Toledo Scale Co., Toledo, O. and electric furnace, Detroit Electric Furnace Co., Detroit. The cost of the buildings was approximately $6000. The foundry is equipped to make brass, bronze, copper and aluminum castings up to 1500 pounds in weight. The company has had a steady growth, but now is in a position to handle additional work.

New Trade Publications

VENTILATION—Detroit Steel Products Co., Detroit, has issued a booklet on the methods of industrial airation. The pamphlet outlines 16 points that must be taken into consideration to secure good ventilation on industrial buildings. Diagrams and tables give much data and information relating to the subject. Some of the points considered are how air in a building is changed, utilizing speed and direction of the wind, figuring air flow due to wind, flow due to wind and temperature difference and that due to temperature alone, various types of roofs, etc. The booklet may be used for a source of information to architects, engineers and plant owners who are contemplating the construction of new buildings or by plant, and maintenance and production engineers who are improving ventilating conditions.

ARC WELDERS—General Electric Co., Schenectady, N. Y., describes its belt or motor-driven, stationary or portable, self-excited, variable-voltage, single-operator arc welding machines in a current folder.

GAS RESEARCH—American Gas association, 420 Lexington avenue, New York, has published a bulletin which contains a report of the progress of the association's committee on industrial gas research.

GRINDERS—Chicago Pneumatic Tool Co., 6 East Forty-fourth street, New York, has issued a folder on its new type rotary, air powered, light weight, portable grinder. Sectional views feature the folder.

SAND MIXER—Flynn & Emrich Co., Holliday and Saratoga streets, Baltimore, is circulating a 4-page folder on its sand mixer. The advantages are given and several views show the features of the machine.

MOTORS—Century Electric Co., 1806 Pine street, St. Louis, recently has issued a folder describing its multi-speed, normal starting current, normal torque, general purpose, squirrel cage polyphase induction motors.

AJAX

Signs of the Times—
Speed! Efficiency!

Copper and Brass Rolling Mills throughout this country (and abroad, too) appreciate the speed and efficiency with which they can melt their alloys in the AJAX-WYATT ELECTRIC MELTING FURNACES.

In fact, one large user wrote us that they considered the installation of the Ajax-Wyatt Electric Furnace the "outstanding feature of all the improvements" they had made.

Over 7,000,000 pounds of Non-Ferrous Alloys are melted daily in the Ajax-Wyatt Electric Furnaces, which cut production costs to the extent that installation expense is saved in less than one year.

Don't let your competitors "get the jump" on you. Send for our electrical engineers at once.

AJAX WYATT

ELECTRIC MELTING FURNACES

THE AJAX METAL COMPANY

Established 1880

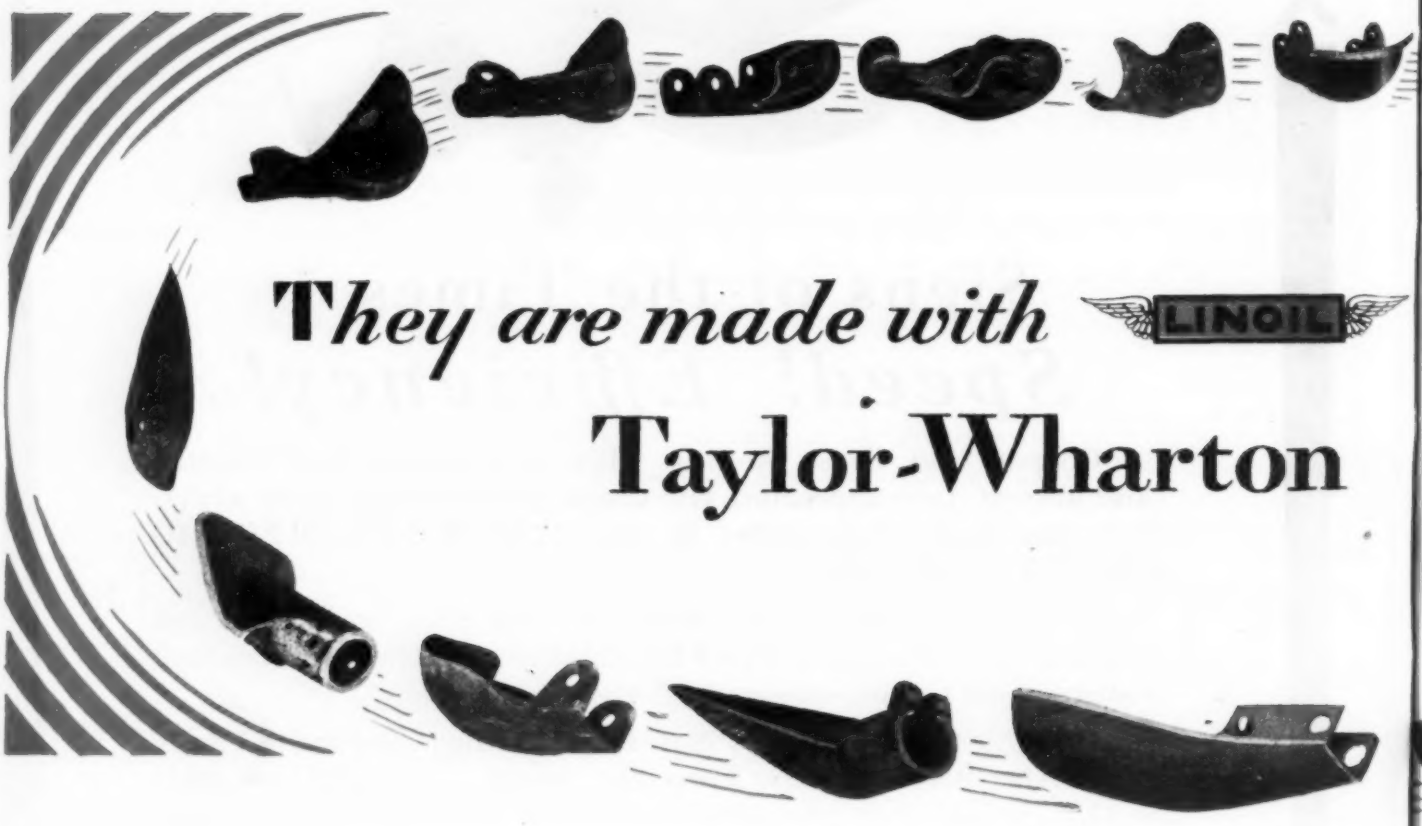
PHILADELPHIA

New York Cleveland Chicago

AJAX

AJAX

Think of the tail skid



They are made with LINOIL Taylor-Wharton

"CONTACT!" A flash of propellers, a crescendo roar, and the good ship glides up the runway gathering speed for its take-off. Forward the landing gear wheels roll smoothly as the Linoil cored carburetor feeds gas into the Linoil cored cylinders, but aft, ah, aft the plane is dragging its tail behind it. Think of the tail skid shoes! *There* is friction! *There* is wear! Cinders, slag, gravel, clay, sand and dust. But the Tisco manganese steel castings made by Taylor-Wharton stand the gaff. Of course, the tail skid shoes are made with Linoil. The Taylor-Wharton Iron & Steel Company have used a good many kinds of core oil in the past, but for five years now they have standardized on Linoil. They like it best, they know it saves money all through the foundry from core room to cleanout. Whether you are making skid shoes or something quite different, contact with Linoil.

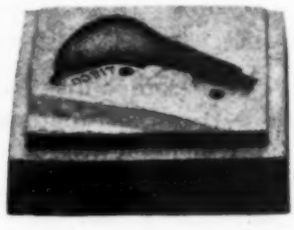
THE WERNER G.

shoes

cores by the

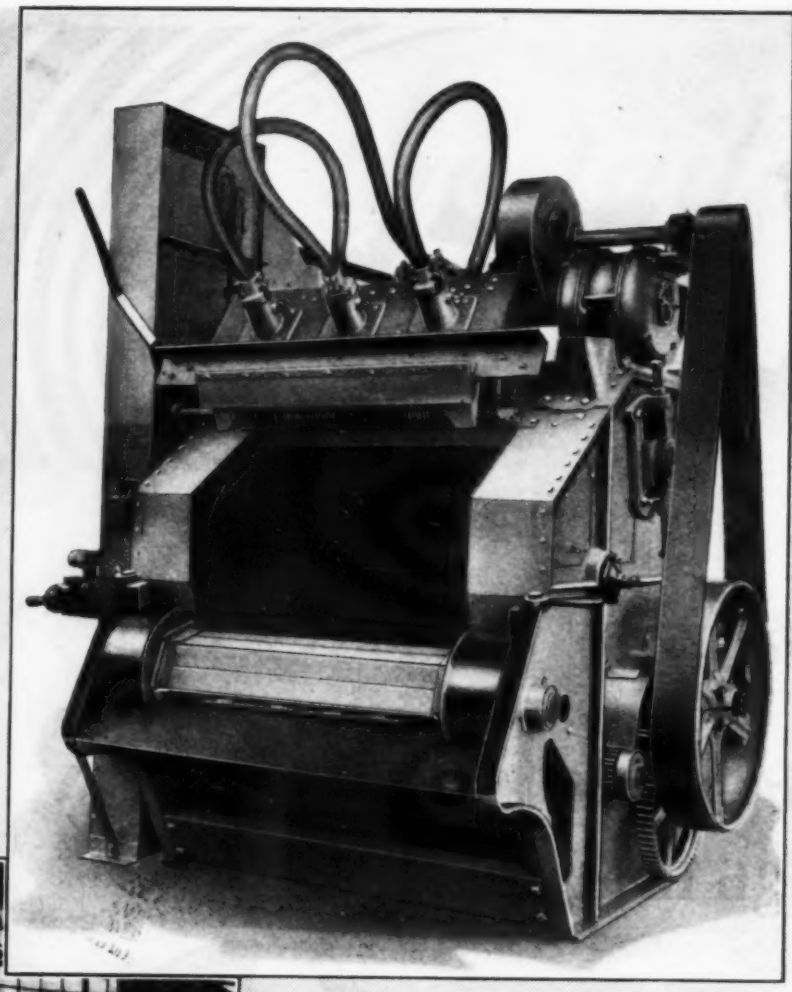
Iron & Steel Company

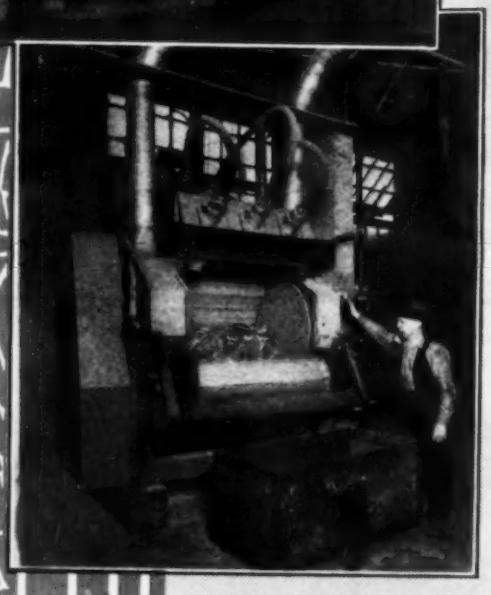
High Bridge, N.J.



ONE tail skid shoe casting and two dry sand molds made with Linoil, the logical oil.

SMITH COMPANY





Illustrations give general view of the American Tum-Blast Cleaner and installations at the plants of a large malleable company and hardware manufacturing company (names on request).

These companies have found the Tum-Blast incomparable in cleaning efficiency. In fact, the machines have been found so satisfactory that each company has already ordered and installed additional units.

Production has been increased and blast costs materially lowered.

Repeat Orders are the Test

A large New England Ball Bearing Company ordered their first American Tum-Blast Cleaner in February, 1929 —a second was ordered in June.

After having ample time to test the utility and figure the savings effected by this remarkable sand blast unit, the above company ordered three at one time to be installed at another plant.

Here is a typical Tum-Blast user. After completely satisfying themselves that the Tum-Blast was all that was claimed for it and that it would produce and better the blasting methods in their own plant, it was decided to standardize completely on this machine. Where the amount of work has warranted, most Tum-Blast users have reordered!

The five Tum-Blast machines are being used for cleaning scale off bearing races after they have been heat treated. Present production runs from five to six hundred pounds per load, five loads per hour.

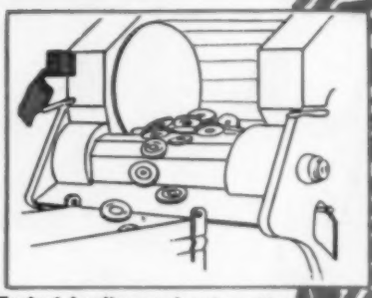
The great quantity of reorders on the Tum-Blast, considering the short space of time since it has been placed on the market and used, should be conclusive proof to all foundrymen that this machine should be included in every new equipment budget. Preparatory to this, we will gladly send complete information and production figures for your careful consideration. No obligation.

The American Foundry Equipment Company

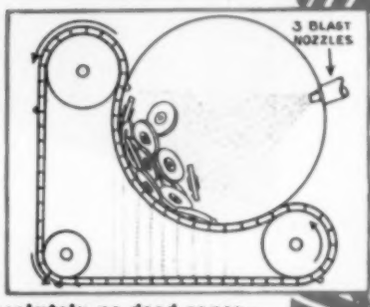
Mishawaka Indiana

The American Line

Sand Cutting Machines, Sand or Metallic Blast Equipment, Tum-Blast Cleaners, Dust Arresters, Core Machines, Aluminum Taper "Strip" Flasks, Steel Pouring Jackets, Pattern Mounting Compound, Rod Straightening and Shear Machines.

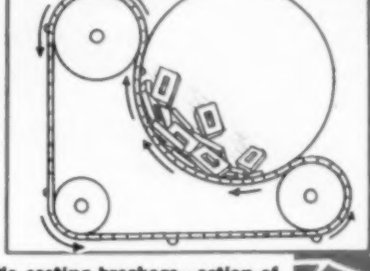


Fastest loading and automatic unloading—unheard of blasting speed.

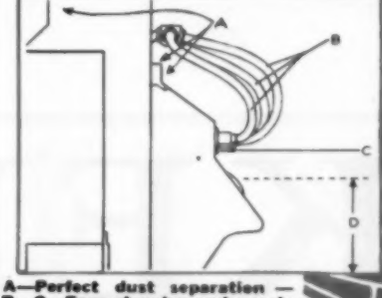


Absolutely no dead zones—complete, uniform and quick coverage of all casting surfaces.

No over or under blasting—easy inspection—every load perfect.

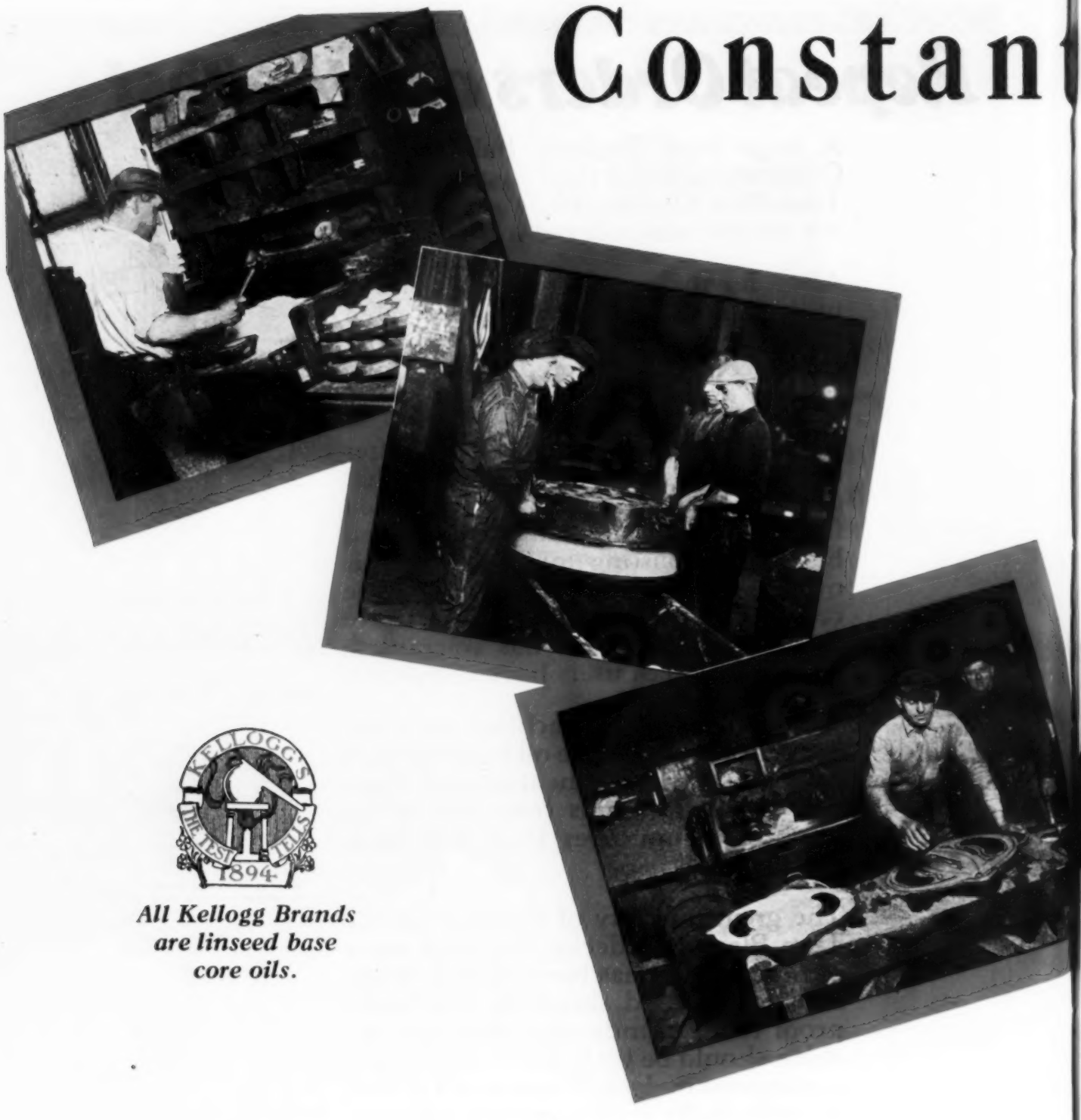


No casting breakage—action of conveyor gives cushioning effect.



A—Perfect dust separation — B—C—Easy abrasive and nozzle checking—D—Low loading point.

Constan



KELLOGG'S THE TEST TELLS 1894

All Kellogg Brands are linseed base core oils.

JOIN THE GRAY IRON INSTITUTE

KELLOGG'S

Care . . .

RESULTS in foundry hinge upon core quality. Sands, binders, proportions in the mix, baking—these are a few of the elements determining that quality and uniformity.

To eliminate the risk element in binding materials, many foundries use Kellogg's Core Oils. They receive a product of the highest uniform quality—made possible by constant carefulness and frequent tests.

By using Kellogg's Core Oils they also obtain all the advantages of the linseed oil base.

SPENCER KELLOGG AND SONS SALES CORP'N
Core Oil Department . . . . . Buffalo, N. Y.

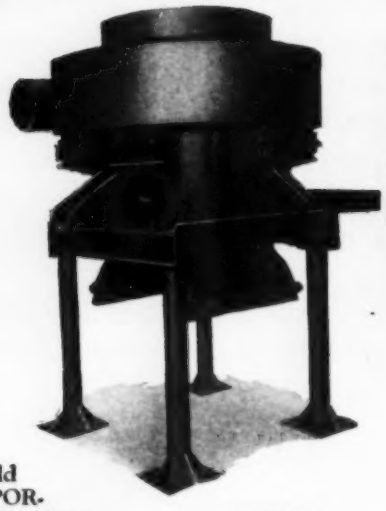
WAREHOUSE POINTS

Minneapolis	*Columbus, O.*	*Boston*	*Kansas City*	*St. Louis*
Cincinnati	*San Francisco*	*New York City*	*Milwaukee*	*Grand Rapids*
Detroit	*Cleveland*	*Springfield, O.*	*Philadelphia*	*Los Angeles*
Chicago	*Buffalo*			

CORE OILS

Increase

Improved WHITING Foundry Equipment



Model B Cupola

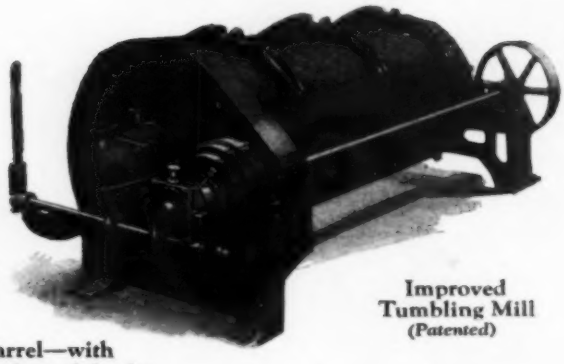
Water Sandblast (Patent Applied For)

Water Sandblast

Knowing the deadliness of the old dry sandblast WHITING CORPORATION developed this new, safe, clean method which cleans castings better than ever before.

Model B Cupola

The result of 45 years experience in cupola building is the Model B—the choice of the largest and best equipped foundries built within the last two years. It retains the rugged features of old WHITING cupolas with many new features.



Improved Tumbling Mill (Patented)

Tumbling Barrels

The WHITING counterbalanced Tumbling Barrel—with its positive door clamp, combination clutch and brake, counterbalanced barrel, pressure lubrication is the sturdiest, safest, and easiest to operate of any tumbler ever offered to foundrymen.

Helical Worm Geared Ladles

Smooth, easy, safe pouring is made possible with this self-locking gearing—ball bearing equipped.

"Wishbone" Cupola Charger

A simple system adaptable to any foundry. It distributes the charges evenly close to the lining —under complete control of the operator. Saves time and labor —paying for itself in 18 months to 2 years.

TIGER Crane

The herringbone geared, Hyatt roller-bearing-equipped crane —with many other new features — that establishes a new standard of crane performance.

Send for Bulletins

Join the Gray Iron Institute

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Ill. (Chicago Suburb)

WHITING

PROFITS NOW

with

WHITING

Improved Foundry Equipment

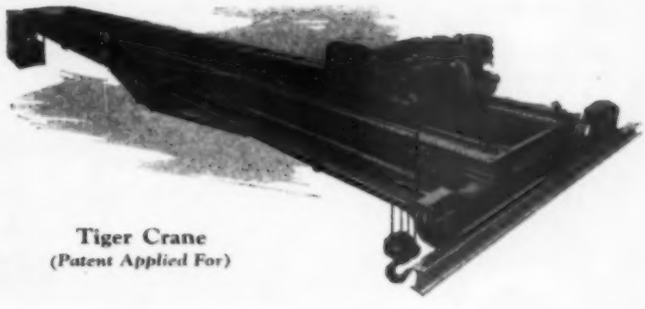
Whiting is constantly developing improvements that will enable you to produce more at lower cost. A few examples of improved equipment offered by Whiting Corporation in the last two years, are shown here.

A continuous program of improvement is the only way to meet competition and increase profits. Send for bulletins showing the latest equipment developed by Whiting.

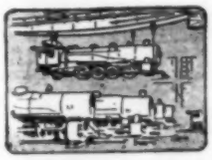
(Patented)

Helical
Worm Geared
Ladle

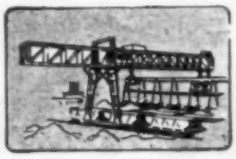
Wishbone
Cupola Charger
(Patent Applied For)



Tiger Crane
(Patent Applied For)



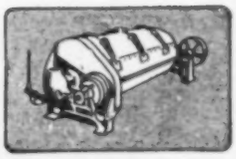
ELECTRIC
TRAVELING CRANES



GANTRY CRANES

FOUNDRY CUPOLAS

LADLES



TUMBLING MILLS

DUST FILTERS

CLEVELAND Sets the Standard by which All Foundry Cranes are Measured

The greater rigidity and strength of Cleveland cranes set the standard by which these important factors in all crane construction are measured. It is the arc-welded steel construction of trolleys, end trucks and bridge girders that gives Cleveland cranes the superior strength and rigidity to withstand the shifting stresses of moving loads. The faster acceleration and the smoother operation of Cleveland cranes also set the standard by which these important operating factors of all cranes are determined. The use of roller bearings throughout, and their most efficient application made possible by arc-welded steel construction, impart to Cleveland cranes these superior operating features which mean a saving of power, perfect lubrication and less maintenance.

Manufacturers of
CLEVELAND
TRAMRAIL SYSTEMS

The Cleveland Crane & Engineering Company, *Wickliffe, Ohio*

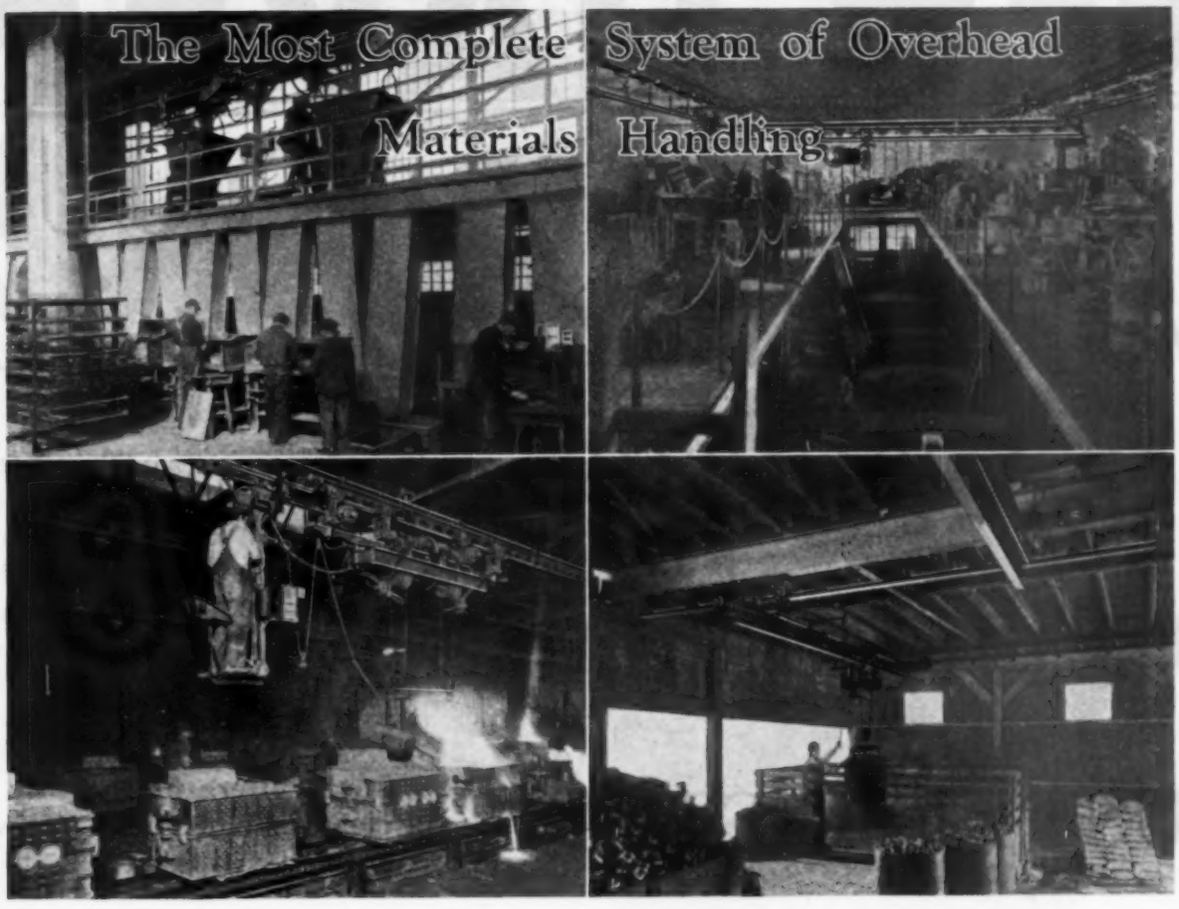
50 Church Street
New York City

512 Farmers Bank Building
Pittsburgh, Penna.

559 Railway Exchange Building
Chicago, Illinois

CLEVELAND CRANES

All Sizes for Every Service



TRAMRAIL your foundry from sand handling to shipping. There is economy in employing only one kind of material handling system for all mechanical handling in the foundry.

Not the Cheapest - but the Best

CLEVELAND ELECTRIC TRAMRAIL

THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO

Akron, O.	608 Flatiron Bldg.	Duluth, Minn.	809 Torrey Bldg.	Mobile, Ala.	112 No. Water St.	St. Louis, Mo.	1903 So. Grand Blvd.
Albany, N. Y.	93 State St.	Easton, Pa.	1826 Washington Bv.	Muskegon, Mich.	1922 Peck St.	St. Paul, Minn.	4th and Robert Bldg.
Atlanta, Ga.	510 Forsyth Bldg.	Elizabeth, N. J.	1180 East Broad St.	Nashville, Tenn.	111 First Ave., So.	San Francisco, Cal.	16 California St.
Baltimore, Md.	525 Calvert Bldg.	Erie, Pa.	402 Scott Block	Newark, N. J.	671 Broad St.	Scranton, Pa.	623½ Crown Ave.
Birmingham, Ala.	835 Martin Bldg.	Evansville, Ind.	20 Furniture Bldg.	New Haven, Conn.	99 Water St.	Seattle, Wash.	240 Central Bldg.
Boston, Mass.	44 Bromfield St.	Fort Wayne, Ind.	(See Toledo)	New Orleans, La.	632 So. Peters St.	Sheboygan, Wis.	2424 No. 4th St.
Brooklyn, N. Y.	682 Bedford Ave.	Harrisburg, Pa.	1021 No. 15th St.	New York, N. Y.	75 West St.	Springfield, Mass.	228 Dwight St.
Buffalo, N. Y.	405 Brisbane Bldg.	Indianapolis, Ind.	19 W. South St.	New York, N. Y.	50 Church St.	Syracuse, N. Y.	318 No. Clinton St.
Camden, N. J.	(See Trenton)	Johnstown, Pa.	507 Bedford St.	Nutley, N. J.	500 Kingsland Rd.	Terre Haute, Ind.	10-12 No. First Ave.
Charlotte, N. C.	910 Com Bk. Bld.	Joliet, Ill.	107 No. Chicago St.	Peoria, Ill.	2113 Main St.	Toledo, Ohio	2319 Elm St.
Chattanooga, Tenn.	406 Provident Bldg.	Kansas City, Mo.	18th and Clay St.	Philadelphia, Pa.	2401 Chestnut St.	Toronto, Ont. Can.	159 Bay St.
Chicago, Ill.	565 Washington St.	Knoxville, Tenn.	543 New Sprankle Bldg.	Pittsburgh, Pa.	412 House Bldg.	Trenton, N. J.	New York Ave. and Spruce St.
Cincinnati, O.	318 Sycamore St.	Los Angeles, Calif.	430 East Third St.	Portland, Me.	19 Commercial St.	Tulsa, Okla.	313 Public Service Bldg.
Cleveland, O.	718 East 105th St.	Louisville, Ky.	513 Columbia Bldg.	Providence, R. I.	156 W. Exchange St.	Williamsport, Pa.	238 West St.
Columbus, O.	499 South Third St.	Memphis, Tenn.	1352 Madison Ave.	Quincy, Mass	Norfolk Downs	Worcester, Mass.	149 Commercial St.
Davenport, Iowa	2108 Grand Ave.	Milwaukee, Wis.	4939 Medford Ave.	Rochester, N. Y.	420 St. Paul St.	Youngstown, O.	705 Market St.
Dayton, O.	618 Harries Bldg.	Minneapolis, Minn.	2428 Riverside Ave.	Rockford, Ill.	623 Seventh St.		
Denver, Colo.	1626 Detroit St.			St. Louis, Mo.	1407 Pine St.		
Detroit, Mich.	149 East Larned St.						

CLEVELAND

HAND OR ELECTRIC TRAMRAIL

NEW HAVEN

for YOUR PARTICULAR *cleaning job*

BLAST UNITS

TUMBLING MILLS

DUST ARRESTORS

It matters not whether you are cleaning large tonnages of similar castings, or varying quantities of castings of many shapes and sizes . . . . New Haven Equipment is increasing production and cutting cleaning costs in many foundries.

Write for literature on any type of cleaning equipment in which you may be interested.

THE NEW HAVEN SAND BLAST COMPANY

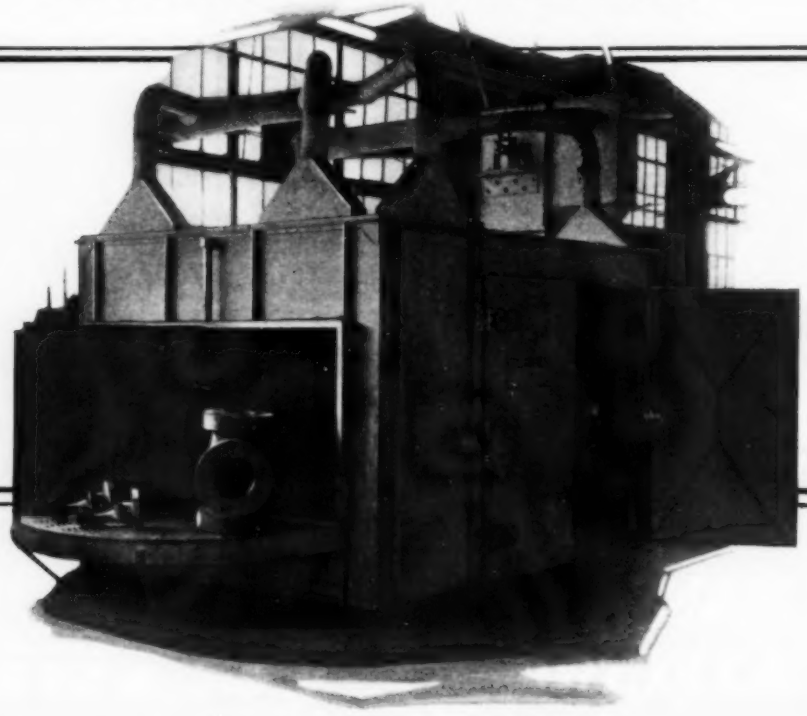
CLEVELAND NEW HAVEN

Buffalo Chicago Detroit Birmingham San Francisco

There's a New Haven Unit for Every Cleaning Job

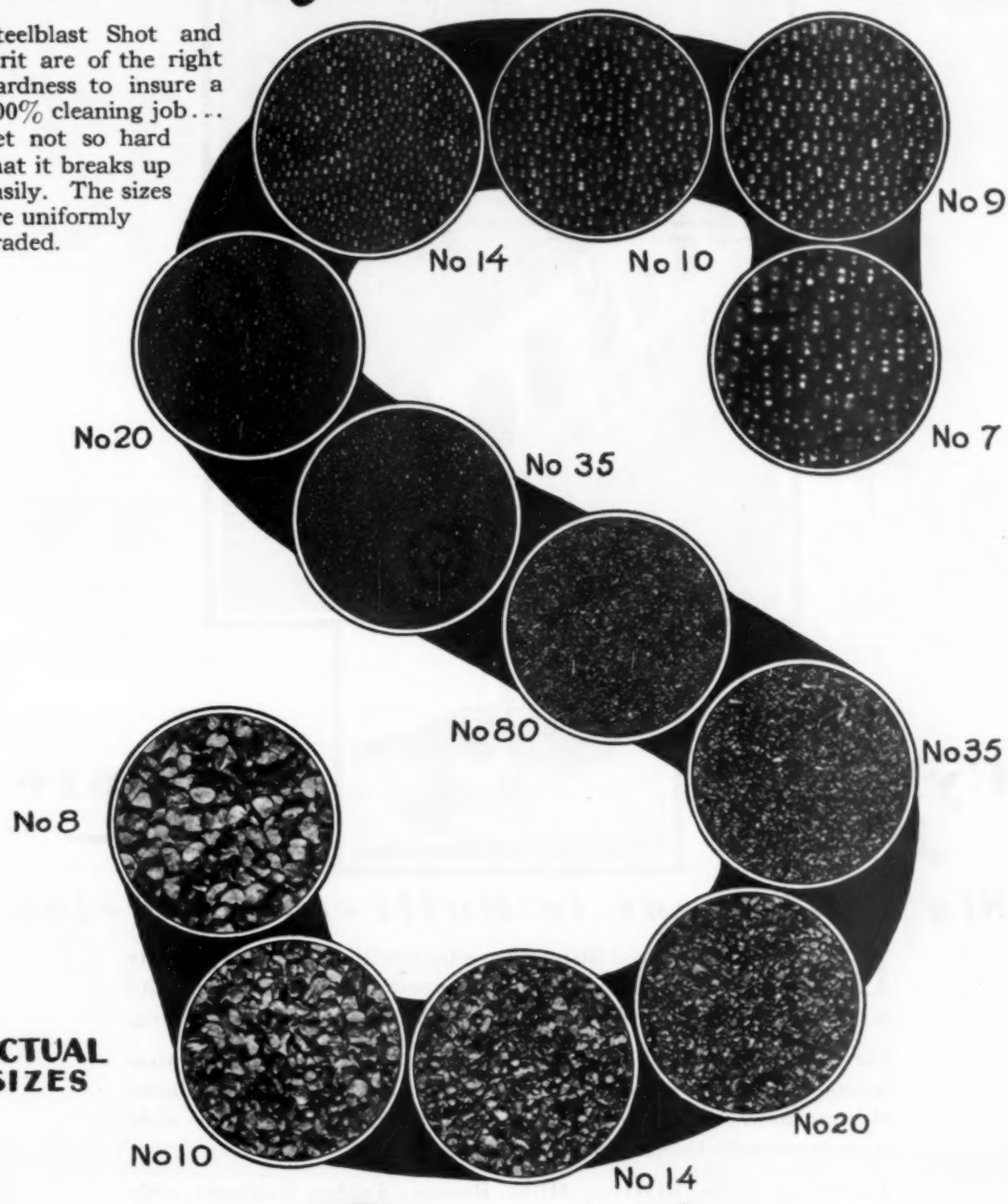
Then
They bought
NEW HAVEN

After studying many designs of rooms, this large foundry installed a New Haven Room strictly on the basis of performance and durability. It is a typical New Haven installation.



Get Our Quotation For 1930

Steelblast Shot and Grit are of the right hardness to insure a 100% cleaning job . . . yet not so hard that it breaks up easily. The sizes are uniformly graded.

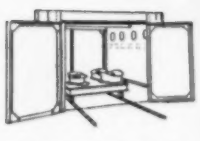


ACTUAL SIZES

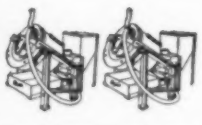
Write for samples and prices

STEELBLAST SHOT AND GRIT

Made by
STEELBLAST ABRASIVES CO.
354 Erie Bldg.
Cleveland, Ohio



Cylinder-block in Sly-blast Room, at a large production foundry. Rooms are equipped for monorail, car-and-track, and other handling methods.



Small heat-treat jobs are sandblasted without scarring, in Sly Tilted Blasting Mills, to remove heat-treat scale before over-all finishing.

For Cylinder Block

or Delicate Drills—

Sly equipment is Built-for-the-job

BIG cylinder block and little sharp-edged drill—there's a type of Sly Cleaning Equipment for each, designed and built and sold and serviced by men whose *business* is foundry and forge-shop cleaning.

For Sly Equipment covers the entire range of cleaning requirements, from heavy Tumbling Mills to little Sandblast Cabinets. Sly engineers can recommend and furnish whatever their wide experience tells them is best—for *you*!

Tumbling Mills, Blasting Mills, Rooms, Tables, Cabinets—Sly builds them all, and specifies freely whichever your jobs call for.

BLAST-CLEANING—TUMBLING MILLS—DUST ARRESTERS

SLY

Send for Literature on your own Cleaning Jobs.

THE W. W. SLY MANUFACTURING CO.
4702 TRAIN AVE. · CLEVELAND, OHIO
Offices in Principal Cities

SLY

SPEED UP BLASTING—DROP YOUR COST!

The possible saving in your cleaning cost with "Certified" Abrasive justifies its serious consideration.

Obviously, your decision to use "Certified" Steel Abrasive will come as a result of an investigation on your part.

We urge such an investigation! Many plants, similar to yours, use "Certified" Abrasive and have reduced the cost of blasting to one-half that of sand.

Why not make a test with "Certified" Abrasive? Prove its economy on your own work, in your own plant.

ANGULAR STEEL GRIT **SAMSON STEEL SHOT**

Manufactured only by:

Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

Steel Shot & Grit Co., Amesbury, Mass.

Certified Steel Abrasive is recommended by the leading Sand-Blast Manufacturers

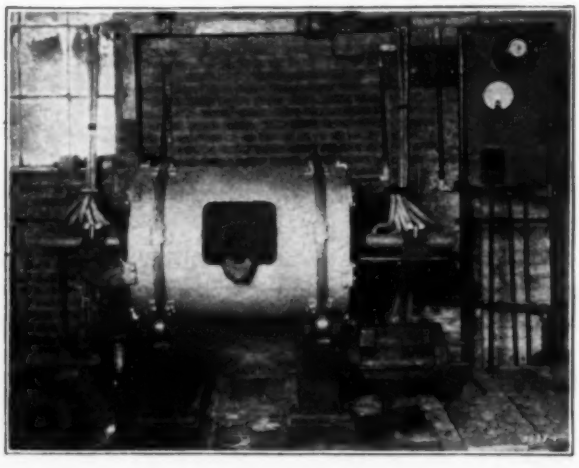
PROFITS

That's really what you're after in your foundry business,—*PROFITS!* With that idea in mind, if we can definitely show you a thirty to fifty percent reduction in melting cost together with a material increase in the percentage of good castings shipped, with lowered cost of supervision, inspection and operation, isn't that sufficient justification of a healthy interest in the use of

Detroit Electric Furnaces

"Ask the Man Who Uses One"

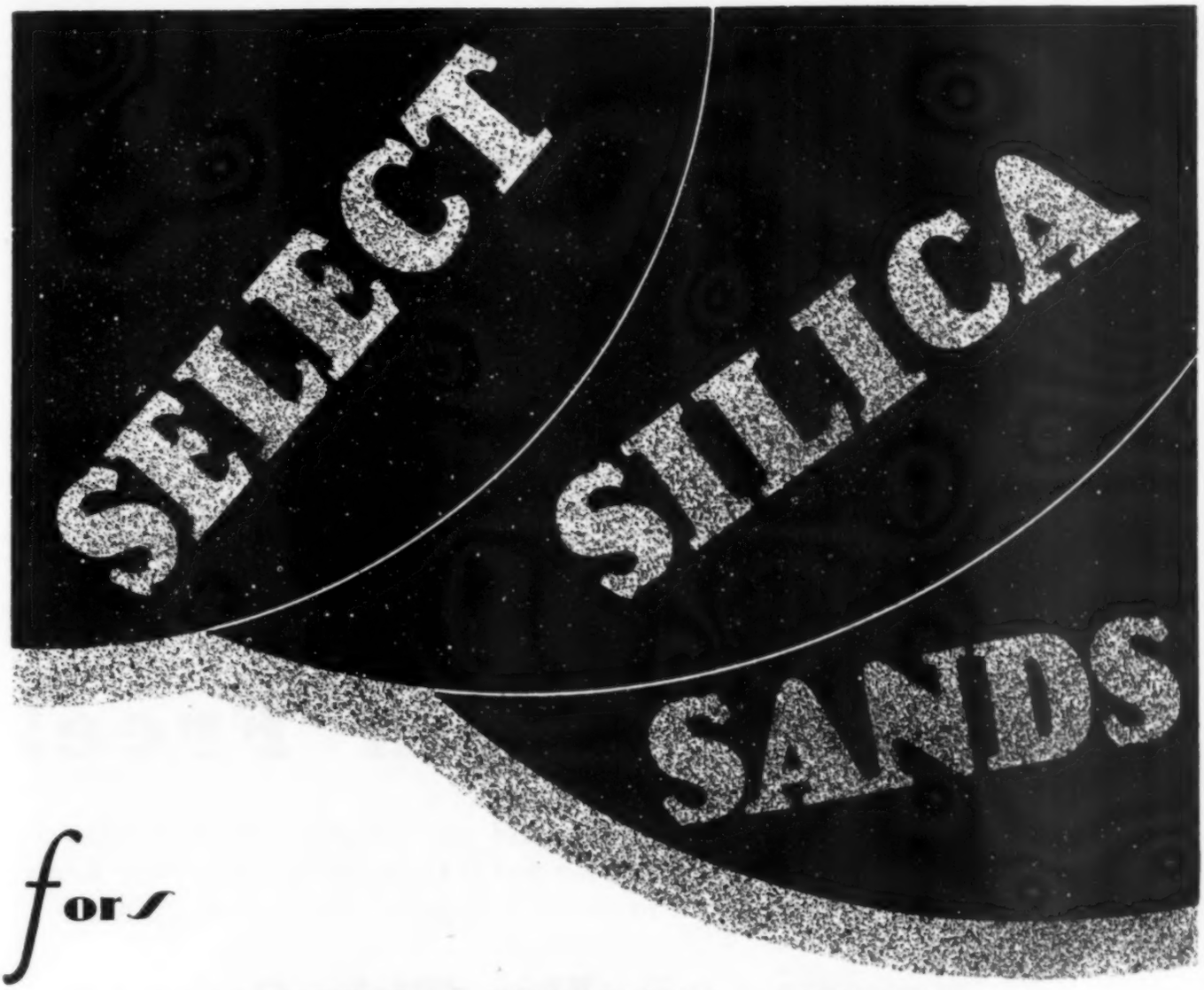
Quality Under Definite Control at all times



Costs Materially Lower than By other Methods

Detroit Electric Furnace Co.

Detroit, Mich. **San Francisco, Cal.**



for

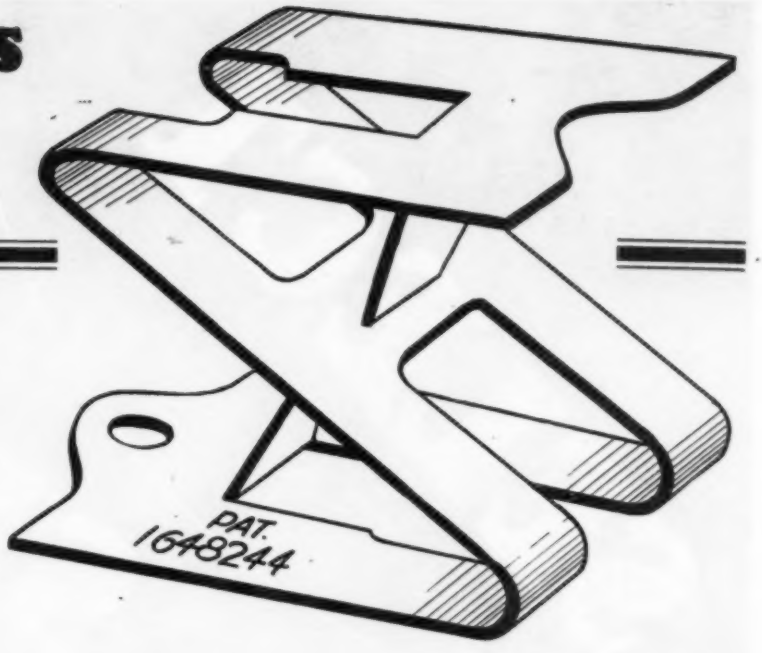
STEEL MOLDING, CORES
SAND BLASTING
FURNACE BOTTOMS
HOT TOPS, ETC.

"Start your castings right with Industrial steel molding and core sands, and finish them right with Industrial sandblast sands."

INDUSTRIAL SILICA CORPORATION
YOUNGSTOWN, OHIO

Select Sizes

Height	Size Heads
3/16"	1/4" x 5/16"
1/4"	3/8" x 3/8"
5/16"	1/2" x 1/2"
3/8"	1/2" x 1/2"
7/16"	1/2" x 1/2"
1/2"	1/2" x 1/2"
1/2"	7/8" x 7/8"
9/16"	7/8" x 7/8"
5/8"	7/8" x 7/8"
11/16"	7/8" x 7/8"
3/4"	7/8" x 7/8"
13/16"	1" x 1"
1"	1" x 1 1/8"



And Try Them Free!

Are you on? Say the word and we'll send you samples for free trial on Reeder Non-chillable Chaplets. Thus we put it right up to you. We know we have something good and want to prove it to you. Give us a chance.

In the Reeder you have a Chaplet that is:—

A strong, thin section chaplet.

Non-chillable due to its design and metal thickness.

Accurate and uniform in height.

Open construction that doesn't obstruct flow of metal.

Z-shape that does not impair strength of casting.

Open construction that gives proper ventilation.

A chaplet that eliminates welding and caulking.

Use This Coupon

Date.....

Gentlemen:—

I'll give you a chance! Send me Reeder Non-Chillable Chaplets in sizes noted below:

.....

.....

.....

Name .....

Company.....

Address .....

City .....

State.....

Reeder Mfg. Co.

6229 Delmar Boulevard

St. Louis, Mo.

FLINT SHOT
FLINT SHOT
FLINT SHOT

The Ideal

core binder for general use is the one that produces both green and dry bond and can be used for facing.

K-B

Core Binder

meets these requirements more fully than other corn flour binders and its always dependable quality is acclaimed by foundrymen from one end of the country to the other. These foundrymen know what they want and most generally specify K-B in their requisitions.

No one is too busy~ ~ ~

to investigate a material which may prove of economical value.

Knefler-Bates Company
Indianapolis, Ind.

Distributing Warehouses located in all principal American Cities

Agents for Great Britain: Yorkshire Amalgamated Products, Ltd., 27 Waterdale, Doncaster, England

Agents for Scandinavian countries: Otto Madsen, Copenhagen, Denmark

COLEMAN CAR TYPE OVENS

LARGE work requires large ovens. We have built many of the largest and most successful car type core and mold oven installations in this country.

Fast operation—frequently less than half the former drying or baking time.

Dependable output—absolutely uniform baking and drying from all parts of the oven.

Unusual fuel economy—savings often sufficient to pay for the entire cost of the installation within a year or two.

Completely built and installed by our own organization. Fully guaranteed in every respect.

Write for complete catalog F.

The FOUNDRY EQUIPMENT Co.

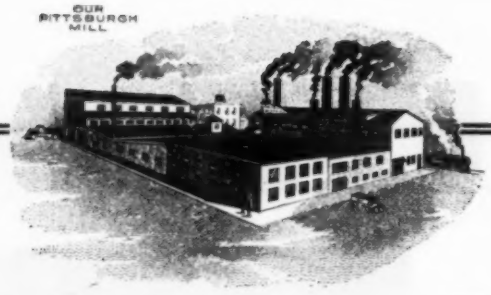
Builders of Foundry Ovens & Furnaces
Contracting Engineers *and* Manufacturers
CLEVELAND, OHIO

COLEMAN CORE & MOLD OVENS

ANY TYPE
Portable Rack, Rolling Drawer, Car Type, Conveyor, etc.

ANY FUEL
Coke, Coal, Oil, Gas Electricity, etc.

ANY SIZE
To Suit All Core Room and Foundry Conditions



Complete Service to Foundries

Melting

Cupolas and Linings
Blowers and Control
Brass Furnaces
Aluminum Furnaces
Crucibles
Oil and Gas Burners
Furnace Linings
H-T Cement
Coke
Purite
Reservoir Ladles

Core Room

Ovens
Benches
Core Machines
Core Sand Mixers
Core Binders
Core Paste
Core Wash
Molasses
Rosin
Core Oil
Glutrin
Sand
Core Wire (Cut)

Molding

Sand
Flasks
Molders Tools
Molding Machines
Sea Coal Facing
Parting
Sprayers
Facings
Blackings
Vibrators
Chaplets
Bellows
Plumbago
Graphites
Chill Coils
Core Ties

Pouring

Ladles
Cranes
Trolleys
Hoists
Buggy Ladles
Pouring Devices
Crucible Tongs
Ladle Shanks and Bails
Crane Ladles

Cleaning

Brushes
Grinders
Rumblers
Stars
Sand Blast
Steel Shot and Grit
Sprue Cutters
Band Saws
Chippers

Sand Conditioners

Electric Riddlers
Sand Mixers
Sand Aerators
Sand Blenders
Magnetic Separators
Dump Buckets

Pattern Supplies

Fillet
Dowels
Pattern Letters
Electric Glue Pots
Glue
Shellac
Machinery
Rapping Plates

J. S. McCormick Company

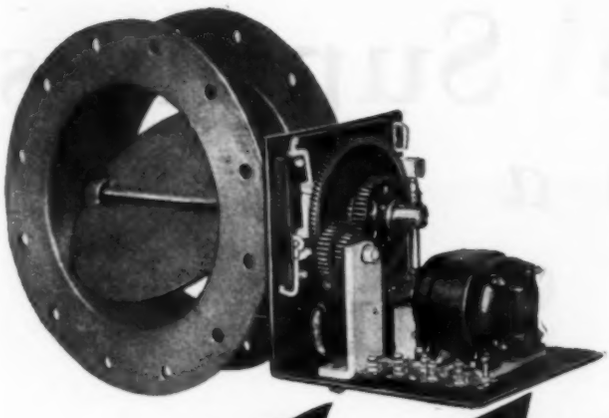
Manufacturers — Importers — Exporters

Foundry Facings - Supplies - Equipment

GENERAL OFFICES:
25th Street and A. V. R. R., Pittsburgh, Pa., U. S. A.
Telephone GRant 7246-7247-7248

Pittsburgh Mauch Chunk Milwaukee Philadelphia Canton

Don't forget—we want your next inquiry.



7 dollars a day saving

and the best castings we've ever produced

"OUR General Electric, automatic, cupola-blower control is giving us a direct saving of $7 a day", says the vice-president of a large foundry, "and the best castings we ever produced.

"The blast-gate regulator, by delivering a definite weight of air, makes the control of the blast an extremely simple and certain proposition.

"Our experience has been such that we not only highly recommend this equipment for new installations, but also think it should be considered by all foundries that have old equipments now in use.

"We feel, that in our own case, the savings we are making will pay for the equipment in approximately one year."

From all over the country come similar reports of the remarkable success of the G-E constant-weight cupola blower. If you will call or write the nearest G-E office, the G-E blower specialist will be glad to give you full details, and to show you installations.

BLOWERS THAT LOWER THE COST OF AIR

321-41

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Dependable Supplies *from a* Reliable Source

As owners of vast properties where we produce our sands, clays, and carbonaceous materials, we can guarantee a high quality, — a reasonable price, — and prompt service.

Moulding Sands

Albany
Amboy
Catawissa
Millville Gravel
North River
Lumberton
Tullytown
Fire Sand

Sands for Steel Castings

Strong Silica
Sharp Silica
Furnace Bottom Sand

Core Sands

Washed and Unwashed Silica Sands

Clay (Lump & Pulverized)

Abrasive Sands

Sand Blast Sand
Angular Steel Grit
Ottawa Sand
Steel Shot
Carborundum Fire Sand

Carbonaceous Materials

Plumbago Facings: Three excellent standard qualities:
No. 100 at 6c per lb.
No. 200 at 5c per lb.
No. 300 at 4c per lb.

Armour Core Blacking
Seacoal Facing

Hifracto Furnace Cement
Parting Compound

As agents for reputable foundry supplies and equipment, we are prepared to furnish every item used in the foundry. Let us quote on any requirement you may have.

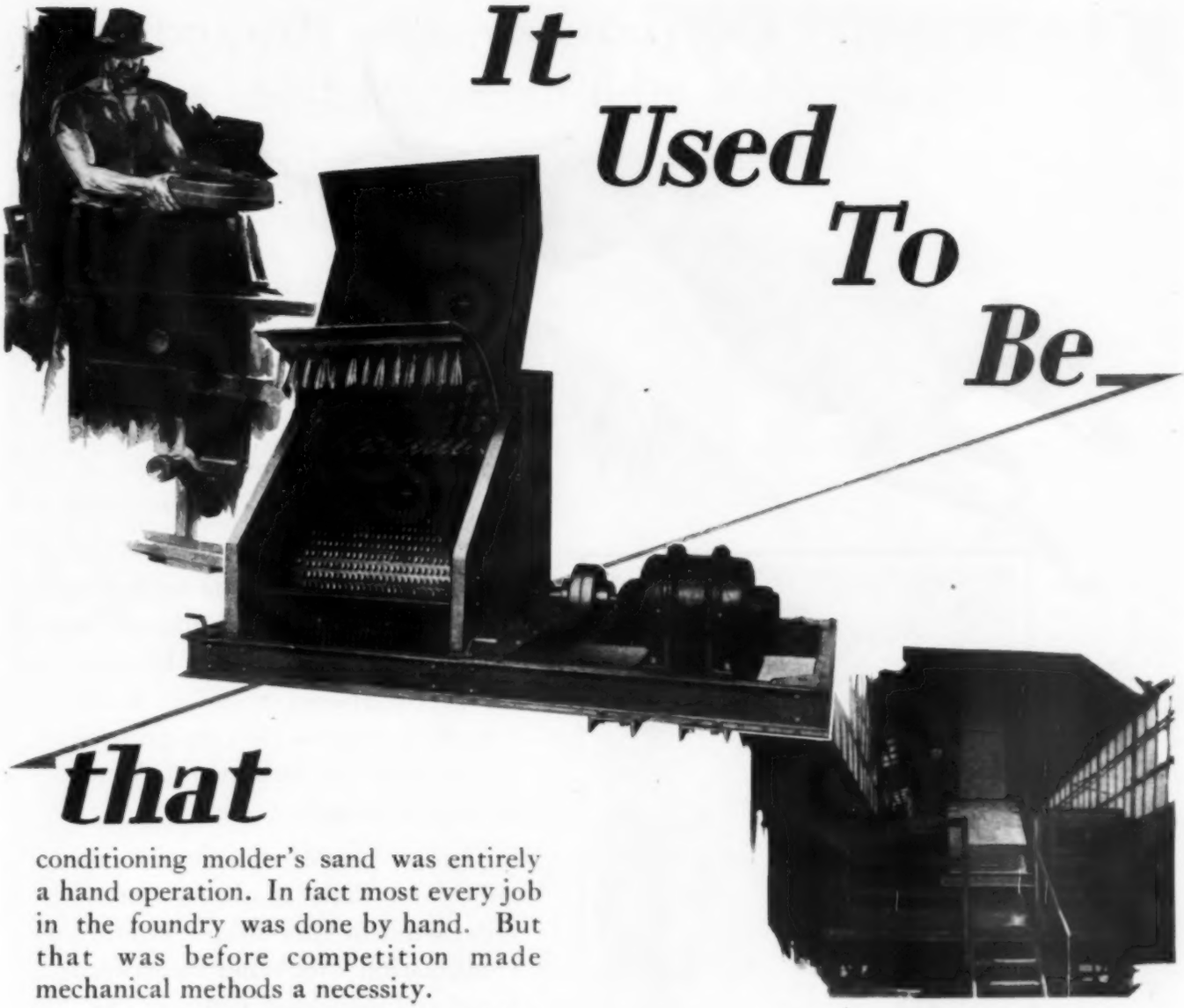
GEORGE F. PETTINOS — SANDS AND SUPPLIES — PLUMBAGO FACINGS

"Once a Customer-Always a Friend"

GEORGE F. PETTINOS

MAIN OFFICES
1206 LOCUST ST. PHILADELPHIA, U.S.A.

It Used To Be that



conditioning molder's sand was entirely a hand operation. In fact most every job in the foundry was done by hand. But that was before competition made mechanical methods a necessity.

Today, in modern production foundries, you see the Jeffrey Sand Conditioner performing the same operation without the aid of human hands.

In addition to helping make the mechanical preparation of sand a success, the Conditioner produces a sand of superior texture, high permeability, and free from clay balls and lumps.

Cleaner and better castings result—sand costs are lowered and casting rejections are minimized.

A Jeffrey Foundry Engineer can explain how these results can be had in your own foundry. A word from you will give him that opportunity.

The Jeffrey Manufacturing Company

907-99 North Fourth Street, Columbus, Ohio

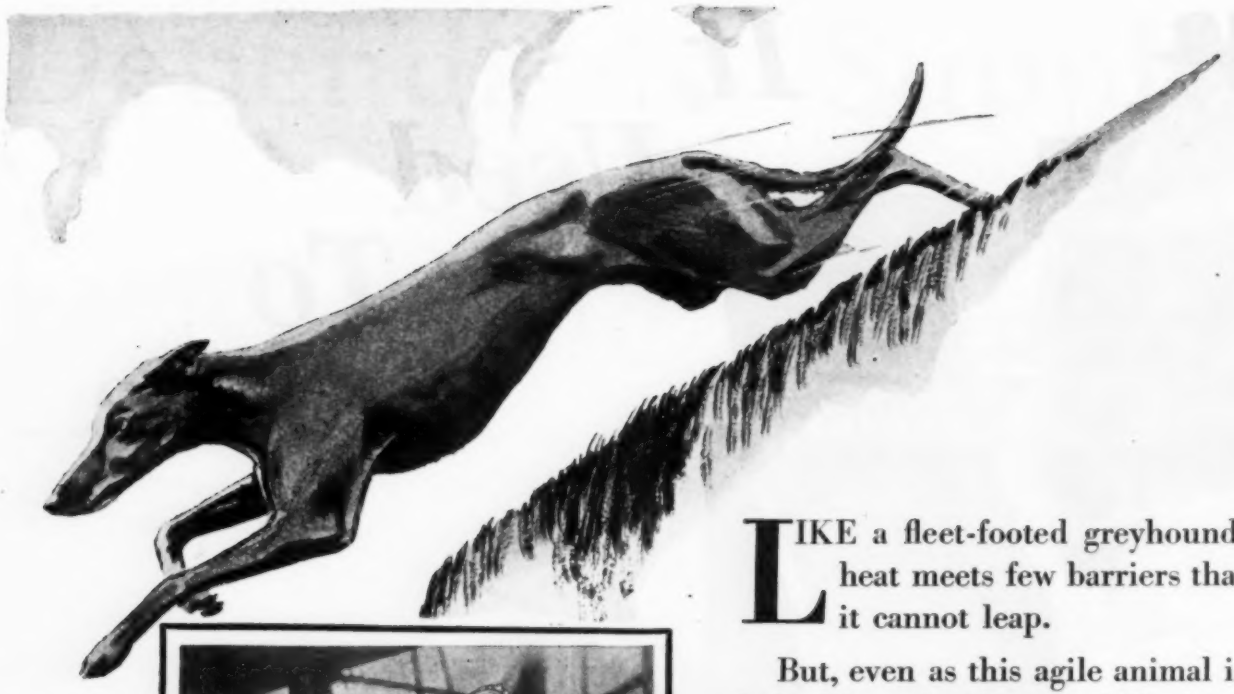
New York	Pittsburgh	Cincinnati	Charleston, W. Va.	Houston
Buffalo	Utica	Cleveland	Milwaukee	Salt Lake City
Rochester, N. Y.	Boston	Detroit	St. Louis	Birmingham
Philadelphia	Scranton, Pa.	Chicago	Denver	Atlanta

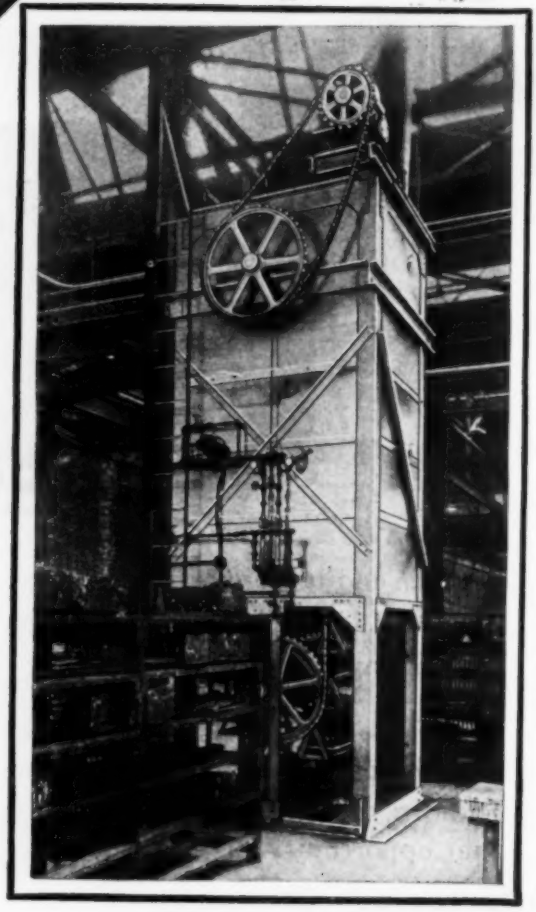
Jeffrey Manufacturing Co., Ltd. of Canada, Head Office: Montreal—Branch Office: Toronto

JEFFREY
MATERIAL HANDLING EQUIPMENT

Jeffrey Foundry Equipment

Sand Conditioner
Conveyors:-
Belt . Carrousel
Reciprocating
Scraper Apron
Bucket Elevators
Vibrating Shakeout Grates
Hoppers and Bins
Flask Fillers
Revolving Screens
Crushers and Pulverizers.





One of a number of Swartwout Vertical Conveyer Ovens used by The Studebaker Corporation, South Bend, Ind.

LIKE a fleet-footed greyhound, heat meets few barriers that it cannot leap.

But, even as this agile animal is halted by a hurdle too difficult to jump, so heat's escape is blocked by the Swartwout Stop-Gap Joint, a modern construction design used exclusively in Swartwout Metal Insulated Ovens.

Contact between inside and outside oven walls is almost totally eliminated by this unique joint, in combination with other Swartwout panel and insulation features. As a result, new production records have been set; new economies effected in almost every plant adopting Swartwout Metal Insulated Ovens . . . *the ovens that hold heat.*

THE SWARTWOUT COMPANY
18511 Euclid Avenue *Cleveland, Ohio*

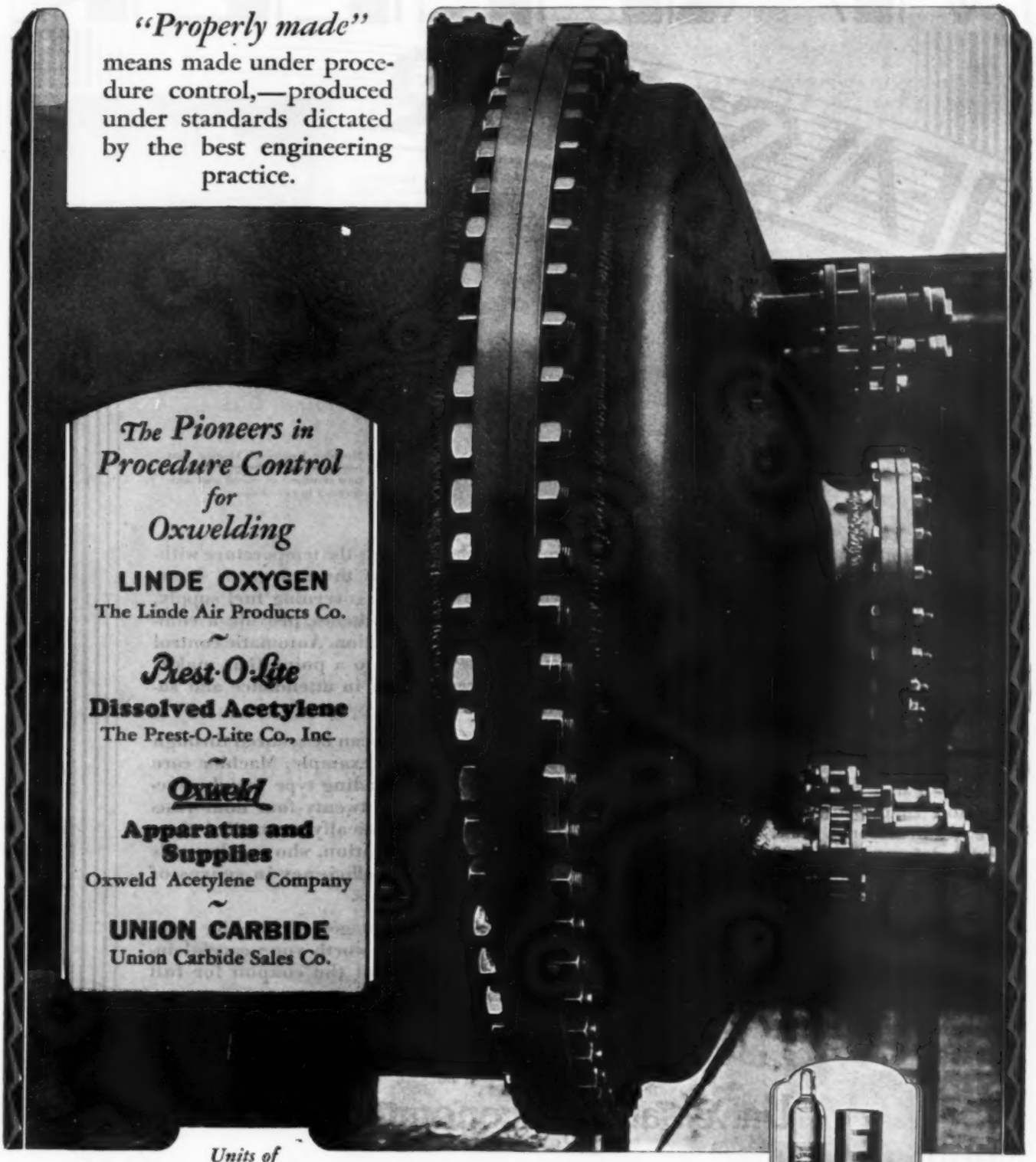
Swartwout Metal Insulated Ovens

Heat cannot jump the Swartwout Stop-Gap Joint.

Send for the Oven Test Blue Prints, interesting data sheets that will enable you to check the efficiency of any oven.

"A properly made oxy-acetylene welded joint is as strong as the base metal, fully 100% efficient . . . ."

"Properly made" means made under procedure control,—produced under standards dictated by the best engineering practice.



The Pioneers in Procedure Control for Oxwelding

LINDE OXYGEN
The Linde Air Products Co.

Prest-O-Lite
Dissolved Acetylene
The Prest-O-Lite Co., Inc.

Oxweld
Apparatus and Supplies
Oxweld Acetylene Company

UNION CARBIDE
Union Carbide Sales Co.

Units of
UNION CARBIDE AND CARBON CORPORATION

General Offices
30 East 42nd St., New York, N. Y.

UCC

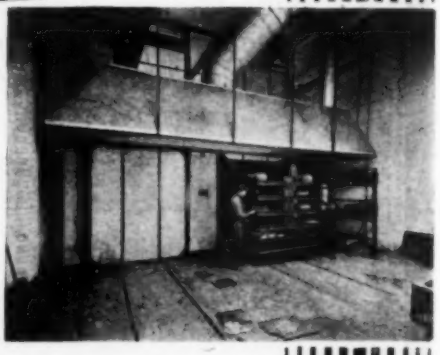
Sales Offices
In principal cities of the country

64 Linde Plants—45 Prest-O-Lite Plants—154 Oxygen Warehouse Stocks—138 Acetylene Warehouse Stocks—38 Apparatus Warehouse Stocks—235 Carbide Warehouse Stocks

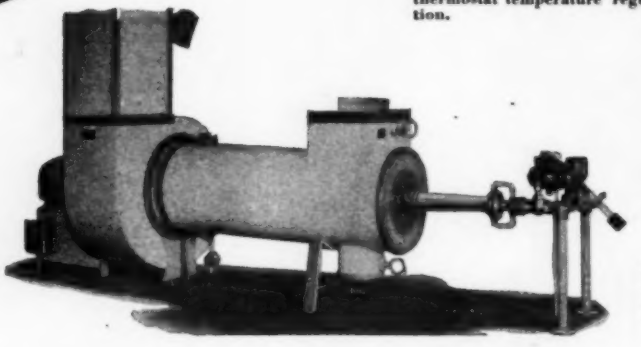
Now is the time to put Eveready Prestone, the perfect anti-freeze, in your automobile radiator—Eveready Prestone is guaranteed by National Carbon Company, Inc., unit of Union Carbide and Carbon Corporation.

MAEHLER

FASTER



Maehler core oven installation for 24-hour operation. Night ovens of battery type with 5-ton charges on steel trucks, automatically controlled by time switches. Day drawer-ovens have thermostat temperature regulation.



Maehler-Universal Heater that brings to the foundry industry a new standard of speed and uniformity in core baking.

WHEN the core department becomes the "neck of the bottle" in foundry production, the cause can usually be traced to faulty oven equipment.

There is a simple but effective remedy for this profit-losing situation—the Maehler-Universal Heater, which may be used to modernize your present core ovens, or employed with Maehler Ovens as a complete installation.

What the Maehler system offers to the core maker is a new and superior principle of operation that insures faster baking and more uniform cores. Convected heat is recirculated from oven to burner and back again in a continuous cycle. This maintains a uniform distribution of heat in all parts of the oven, and bakes the cores evenly whether they are on the side or center of the oven.

Results are mechanically certain, and are not dependent on the skill of the operator. Thermostat regulation holds the temperature within a narrow range of three degrees. Interlocked safety devices, governing fuel supply, fan relay and door switches, provide a complete system of protection. Automatic control has been developed to a point that makes possible large savings in attendance and supervision costs.

Important economies can be secured through night operation. For example: Maehler core ovens of the truck-loading type may be successfully operated on twenty-four hour runs by means of automatically controlled time switches. The installation, shown above, is typical of Maehler efficiency in scores of modern foundry plants.

The profitable advantages of Maehler core oven equipment are worth your careful investigation—just mail the coupon for full particulars.

THE PAUL MAEHLER COMPANY
2200 W. Lake Street, Chicago, Illinois

Universal Economy

OVENS

7496

THE PAUL MAEHLER CO., 2200 W. Lake Street, Chicago, Ill.
Gentlemen: Please send descriptive literature on Maehler core ovens and Maehler-Universal Heaters for foundry application.

Mr.
Firm
Address
Town
State

A Core and Facing Binder Distinctly Superior in Results and Economy

FOR cores requiring green bond and all conditions where green bond is a factor, MOGUL has proved exceptionally efficient—and is distinctly superior in results and economy. Cores do not sag or swell—they come clean from core boxes—and have the right porosity for free venting.

MOGUL is a perfect green sand bond for facings—it produces maximum strength but simultaneously gives natural vents in the sand.

Drop us a line stating your problems and we believe our experienced and practical foundryman can prove to your satisfaction that MOGUL is all that we claim for it.

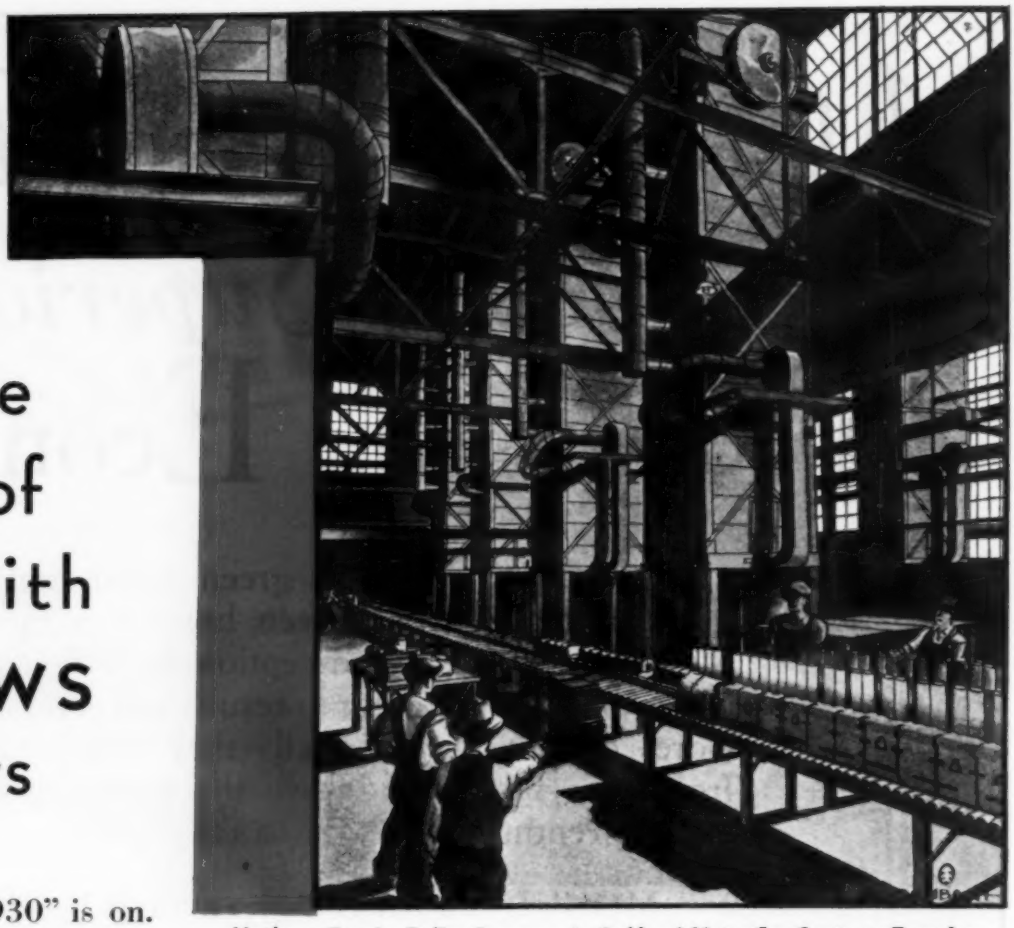
CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York, N. Y.

MOGUL

Made by an
Original and Unique Process

*2

WIN the "Battle of 1930" with MATHEWS conveyers

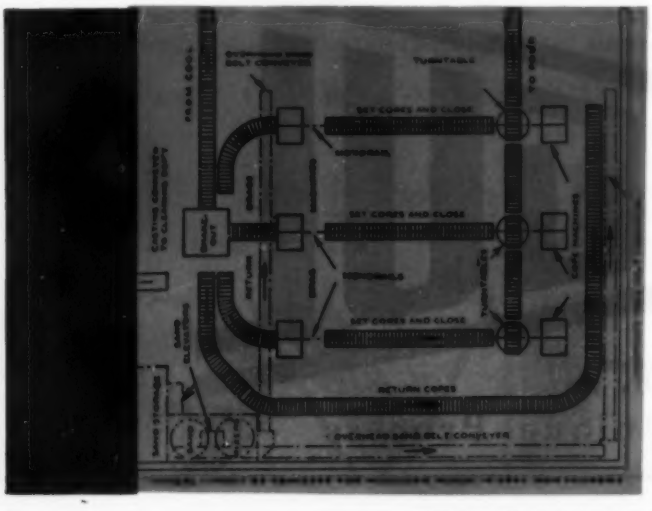


Mathews Gravity Roller Conveyers in Oakland Motor Car Company Foundry.

THE "Battle of 1930" is on. Victory will go to the plants that make the best use of modern methods.

Mathews has more to offer you than ever before in skillfully engineered conveyers of advanced design and fine construction to aid you in this fight for more profits. Mathews Conveyers, both in structural design and in workmanship, are second to none. They are one of the best investments any plant executive can make—giving uninterrupted service over a period of years, paying for themselves over and over again.

Hundreds of important plants have found Mathews Conveyers dependable, and Mathews Engineers helpful in planning for more economical operation. We'll gladly send a new book on conveyers which may give you some valuable suggestions.



MATHEWS CONVEYER COMPANY, *Ellwood City, Pa.*

MATHEWS
CONVEYER SYSTEMS

Atlanta, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Seattle.
Mathews Conveyer Company, Ltd., Port Hope, Ont.

YOU CAN PUT YOUR FINGER ON FOUNDRY TROUBLES IF YOU STANDARDIZE *with* Rosinal

ROSINAL removes the last big unknown from foundry operation. It is rosin in solution—as standard as sugar, as dependable as taxes. Combined with linseed oil—which you buy locally—it forms a core binder whose properties you *know* and over whose characteristics you have complete control.

When troubles hit the foundry and the scrap percentage starts *up*, it's easy to know what's going wrong because metal, sand, melting fuel *and* core binder are all standardized—you know what's in them.

It makes foundry control only a matter of checking materials of *known* properties. It makes trouble easy to remedy because there are no variables in the problem.

Delco
REG. U.S. PAT. OFF.

INDUSTRIAL OIL-PRODUCTS

LINDSAY-McMILLAN CO. MFGRS.
MILWAUKEE WISCONSIN
Plants: Savannah-Milwaukee

HE WHO SIGNS HIS NAME PLEDGES HIS REPUTATION... BY HIS MARK HE LOSES AT ONCE THE SECURITY OF THE NAMELESS

• • •

TO better identify our products we have given them the name of the founder of this company. This decision was made at the beginning of 1929 and during the year we inducted the name and trade mark, as it appears below this text, on products and company effects. Previously goods of our manufacture were designated "High Duty", now they are labeled "Stearns High Duty." The name of the company, however, remains the same, "Magnetic Manufacturing Company, Milwaukee."

The close of 1929 marks a period of full thirty years activity in the magnetic separator industry for Mr. R. H. Stearns. During this span of over a quarter century, Mr. Stearns has taken active part in the practical development of magnetic separation equipment and has contributed much to its present extensive industrial utilization. These years have won Mr. Stearns a well earned recognition in the field. We believe it only fitting, therefore, to add a further measure of recognition by this use of his name as sponsor to the products of the Company; magnetic separators of all types, magnetic pulleys, magnetic clutches, suspended type magnets, apron conveyor magnets, launder magnets, and special magnetic equipment.

R. H. Stearns

President and founder of the MAGNETIC MFG. COMPANY

MAGNETIC MANUFACTURING CO.
278 23rd Avenue Milwaukee, Wis.

HIGH STEARNS DUTY

MAGNETIC EQUIPMENT

PANGBORN

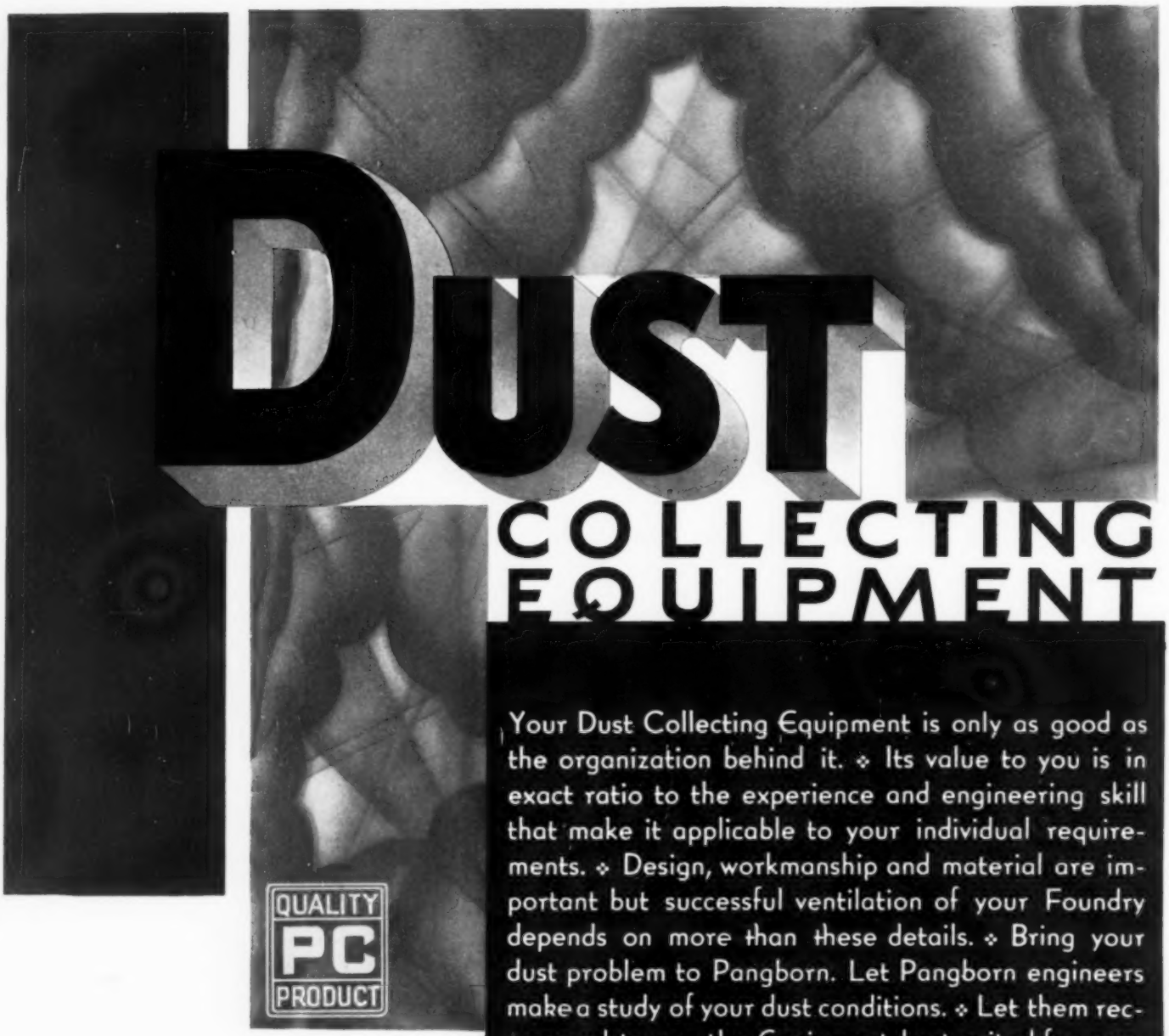
SAND BLAST

QUALITY PC PRODUCT

Your final measure of the value of any product is the acceptance it enjoys with your contemporaries. ⋄ No amount of advertising will sell them a product that is not good. ⋄ Certainly no amount of advertising will sell them, a second time, a product that falls short of being the very best. ⋄ As water seeks its own level, so the popularity of a product soon settles to the level of its real worth. ⋄ We say with pride....go where you will and you will find more Pangborn Equipment than any other kind. ⋄ We say with pride...more than 60% of Pangborn Sales are Repeat Sales. ⋄ ⋄ ⋄ ⋄

COME TO PANGBORN

HAGERSTOWN MD.

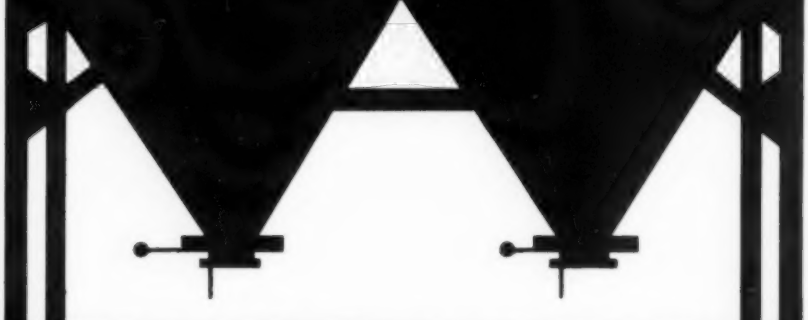


DUST COLLECTING EQUIPMENT

QUALITY PC PRODUCT

Your Dust Collecting Equipment is only as good as the organization behind it. ❖ Its value to you is in exact ratio to the experience and engineering skill that make it applicable to your individual requirements. ❖ Design, workmanship and material are important but successful ventilation of your Foundry depends on more than these details. ❖ Bring your dust problem to Pangborn. Let Pangborn engineers make a study of your dust conditions. ❖ Let them recommend to you the Equipment best suited for your needs. ❖ Their combined experience is at you service.

COME TO PANGBORN



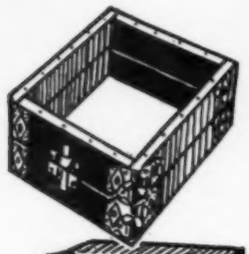
World's Largest Manufacturers Sand-Blast and Dust Collecting Equipment.

PANGBORN

Quality
DIAMOND
Service

DIAMOND STANDARD FLASKS

give maximum resistance to roughest handling.
Made straight side and tapered to 84" and over.
Size 60" to 72" Straight Side $10.00. Tapered Side $1.00 extra.



STEEL BANDS SPECIALLY PRICED ON ALL SIZES

48" x 1½" to 84" x ⅛" and ¼" Steel.
Made of band steel, braked to accurate dimensions, and spot welded. They hold their shape, despite hard usage. All sizes shipped from stock.
Size 72" x 3½" $.72 each!

Top Value In Molding Equipment

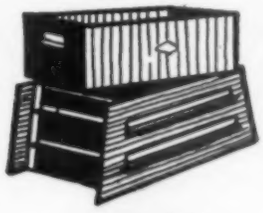
"Diamond" has always tried to make every transaction with foundrymen involve more than a mere exchange of money for material. Ours is not a "one sale" business. You can always depend on the Diamond line.

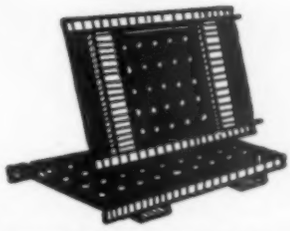
We can supply you promptly with Snap Flasks, Steel Bands, Steel Bottom and Core Plates, Flask and Pattern Makers' Clamps, Mold Jackets, Core Boxes, Pinch Dogs, Rapping Plates, Shakeout Tongs, Hard Wood Wedges, etc., at a price that you'll consider most reasonable.

Ask for Catalog No. 20.

STEEL MOLD JACKETS, Style "E"

No more run outs when Diamond Steel Jackets are used. They are long lasting and economical, retain their shape under most severe service conditions, and will not warp or buckle when subjected to heat. With reinforcing angles, size 72" x 8" $4.38 each. See Catalog No. 20 for other styles and list prices.





DIAMOND STEEL BOTTOM PLATES

are so strongly and ruggedly constructed and solidly braced that they will not warp out of shape. They will last for years. Made in styles and sizes for every use.
Order now—special prices on quantity orders—immediate shipment on standard sizes.

Diamond Clamp & Flask Co.

30-40 N. 14th St., Richmond, Indiana.

Chicago Office: Peoples Gas Bldg.

Telephone Harr. 7071

Buffalo, N. Y.	George F. Crivel & Co.
Chicago, Ill.	Mineral Supply Co.
Cincinnati, O.	Buckeye Products Co.
"	Goehringer Foundry Supply Co.
"	Hill & Griffith Co.
Cleveland, O.	Federal Foundry Supply Co.
"	Osborn Manufacturing Co.
Dayton, O.	Fenton Foundry Supply Co.
Detroit, Mich.	Frederic B. Stevens, Inc.
"	Alfred T. Wagner
"	E. J. Woodison Co.
Indianapolis, Ind.	John M. Glass Co.
Milwaukee, Wis.	Donald Sales & Mfg. Co.
"	Interstate Supply & Equipment Co.
Minneapolis, Minn.	Frost-Naus Co.
New York, N. Y.	Whitehead Brothers Co.
Philadelphia, Pa.	Paxson-Taggart, Inc.
"	Pennsylvania Foundry Supply Co.
Pittsburgh, Pa.	J. S. McCormick Co.
Providence, R. I.	W. Scott Thomas
St. Louis, Mo.	Independent Foundry Supply Co.
Toledo, O.	Freeman Supply Co.

In Canada

Hamilton, Ont.	Hamilton Facing Mill Co.

*2

Where the Best is the Cheapest

AMERICAN STANDARDIZED STEEL SHOT

This shot is uniform in each size, hard and tough.

It is supplied in a range of sizes one of which will meet your conditions best. It comes to you in 100 lb. double bags, easy to handle and requiring just one one-hundredth of the space required for the amount of sand needed to do about the same amount of cleaning.

AMERICAN EVERSHARP STEEL GRIT

Hard, sharp, tough, Eversharp Grit cleans rapidly, thoroughly.

It is graded to various sizes to meet your needs. For cleaning surfaces to be enameled, no other abrasive equals it.

Supplied in 100 lb. bags.

Immediate shipment, bag or carload.

A large user of American Steel Abrasives has good sandblast sand right at his back door—available for the cost of handling.

Why did HE switch to steel?

For Dust Reduction

The sand was dusty—the steel practically dust free and dust was a serious menace to their enamelled products.

For Faster Better Work

This user gets more production from his equipment with steel abrasives—and the surface is more satisfactory for the later processes—free from dust and takes enamel better.

Yes, and for Lower Cost, too

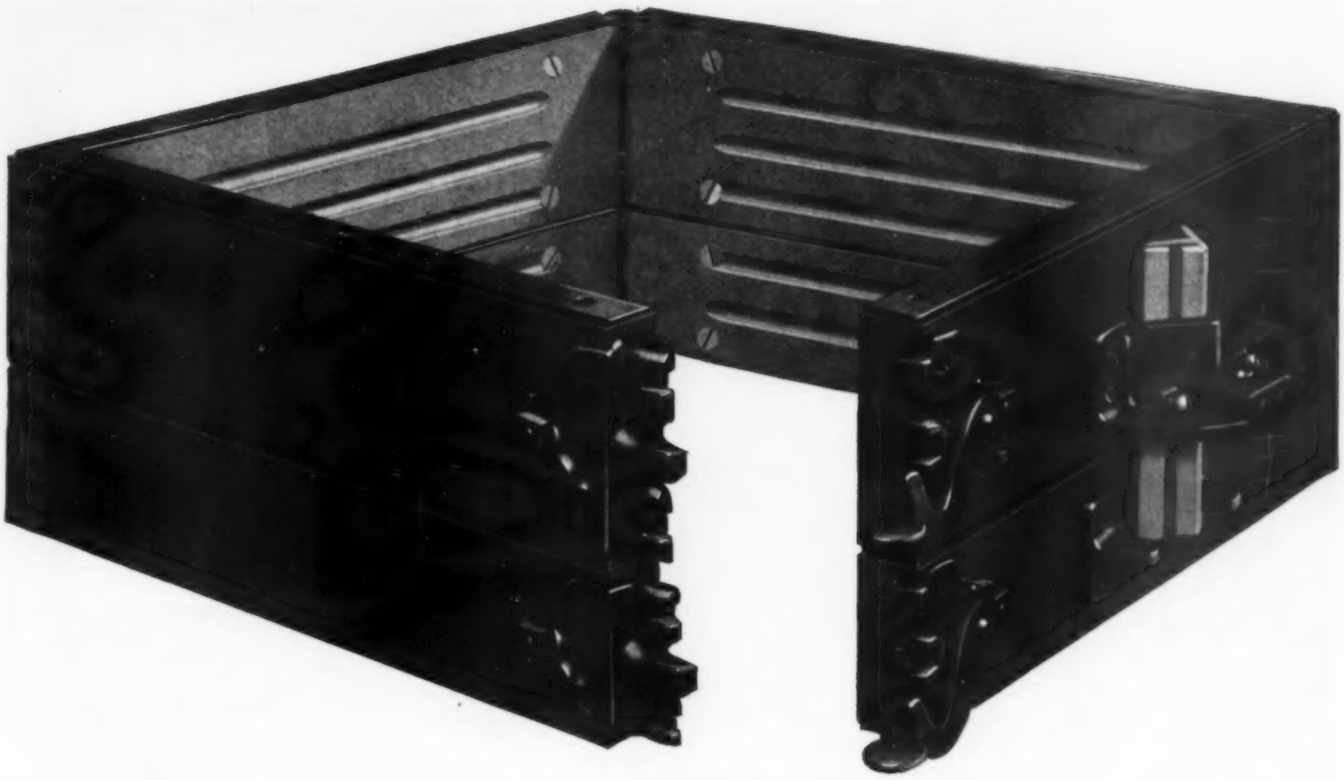
Labor costs plenty. Drying and conditioning an abrasive which breaks down in one or two usings, costs plenty. Removal of spent abrasive costs plenty, so,—a steel abrasive which can be used over and over a hundred times,—doing good work every time, is far superior, as is being proved in hundreds of plants.

Your costs come down, work speeds up, quality improves, and men stay longer when you switch to steel.

Write for samples and full information.

The American Steel Abrasives Co.,
604 Sherman St., Galion, O.

AMERICAN STANDARDIZED STEEL ABRASIVES



ADAMS CHERRY SNAP FLASKS

Possess Remarkable Durability

Adams Steel Jackets are made with the same accuracy and possess the same durability as our flasks. Custom-built to meet your specific requirements. Parkerized to prevent rust.

The selection of proper materials and the methods employed in the building of Adams Cherry Snap Flasks are responsible for the long and satisfactory service which they invariably render.

High-grade cherry lumber is recognized as being best adapted for flasks and it is used exclusively in the building of Adams Cherry Snap Flasks.

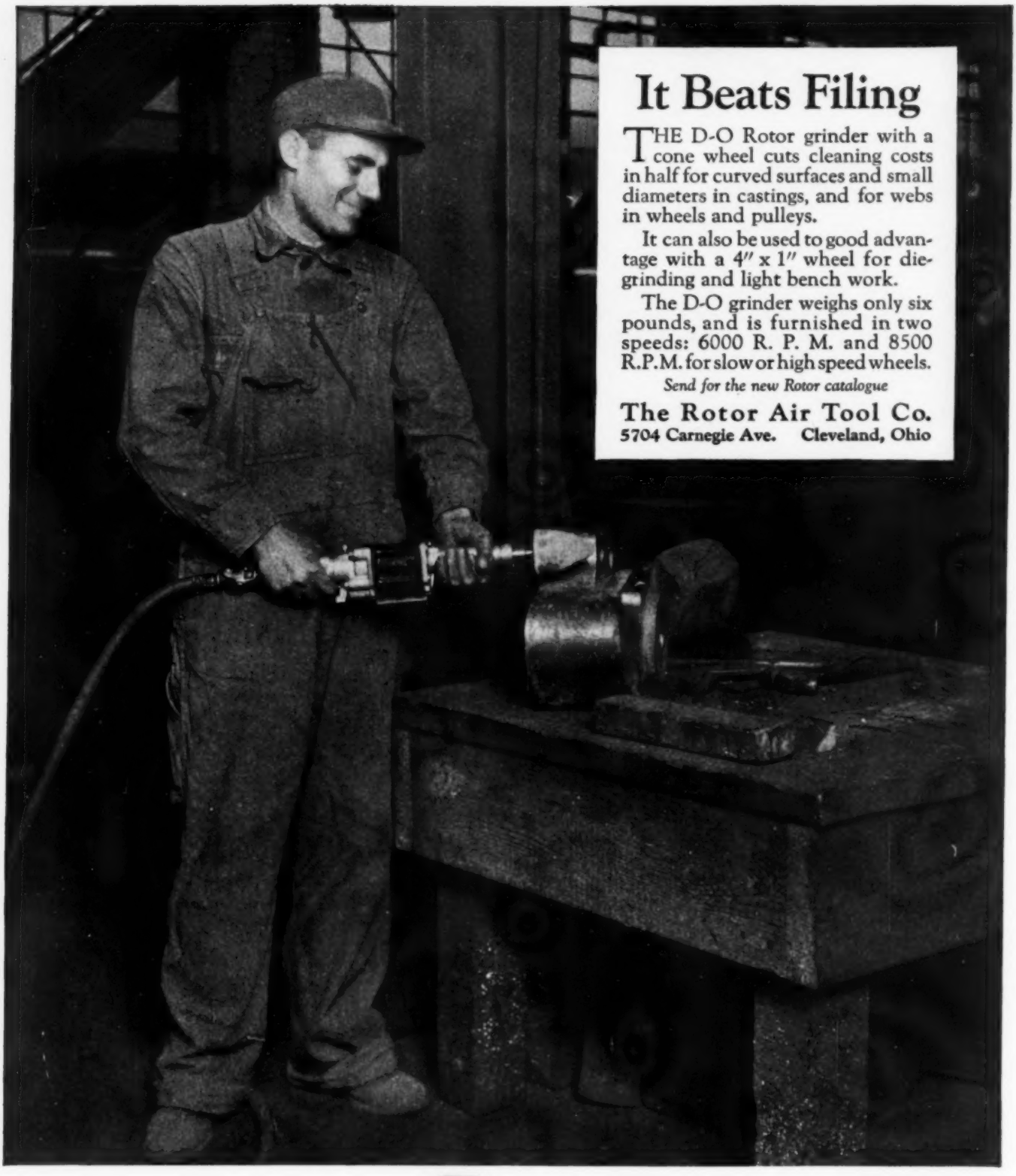
Trimmings are of malleable iron, accurately machined on all bearing surfaces, and are designed for rigidity, rapid operation and convenient adjustments. All trimmings are rust-proofed by Parkerizing.

These are a few of the reasons for the exceptional durability of Adams Cherry Snap Flasks —quality that makes them more economical in the long run.

THE ADAMS COMPANY

ESTABLISHED 1883

175 Foster St. **Dubuque, Iowa**



It Beats Filing

THE D-O Rotor grinder with a cone wheel cuts cleaning costs in half for curved surfaces and small diameters in castings, and for webs in wheels and pulleys.

It can also be used to good advantage with a 4″ x 1″ wheel for die-grinding and light bench work.

The D-O grinder weighs only six pounds, and is furnished in two speeds: 6000 R. P. M. and 8500 R.P.M. for slow or high speed wheels.

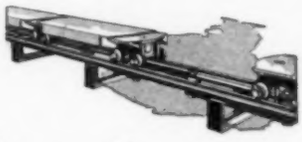
Send for the new Rotor catalogue

The Rotor Air Tool Co.
5704 Carnegie Ave. Cleveland, Ohio

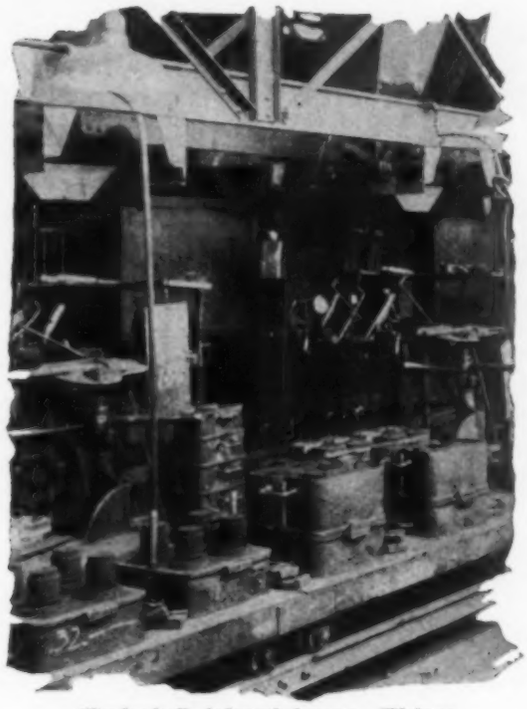
GRINDERS • BUFFERS • SANDERS • DRILLS

Rotor Air Tools

Mold conveyors seem similar; however, Bartlett-Snow differ considerably. They move on wheels to avoid destructive friction. Carrying tops are continuous to protect parts against run-out metal. Driving chains are steel with finished bearing surfaces. Pins are hardened to withstand wear. Fittings are provided for forced lubrication of every joint. Built for foundry service—hardest in the world. Every detail down to the most insignificant bolt is fashioned and proportioned for uninterrupted production. Many conveniences are provided for change of parts when continued wear makes eventual replacement necessary.



Two Words guide its design—



"Production"—industry's keynote. "Uninterrupted production"—Bartlett-Snow's keynote.

Uninterrupted Production

In the minds of Bartlett-Snow engineers are two words—"Uninterrupted Production."

The largest gear—the smallest pin—which go into a foundry installation however large, must pass a test harder than they ever will see in actual service.

Each foundry which trusts Bartlett-Snow with the design of its handling equipment must get a continuous production flow.

Nothing short of this satisfies Bartlett-Snow—and certainly should never satisfy any foundry.

Write for the new "Foundry Book—the Bartlett-Snow Way." It is full of interesting pictures.

THE C. O. BARTLETT & SNOW CO.
6201 Harvard Ave. Cleveland, Ohio

Sole Selling and Manufacturing Representatives
For the Canadian Market:
Peacock Bros., Limited, Montreal
For the British Market:
Pneulec, Limited, Smethwick, near Birmingham

Bartlett - Snow

Kling High Speed Heavy Duty Grinders are well represented in the Chicago Shops of the Link-Belt Company—6 are in constant use snagging and rough grinding sprocket wheels, and light and heavy steel castings.

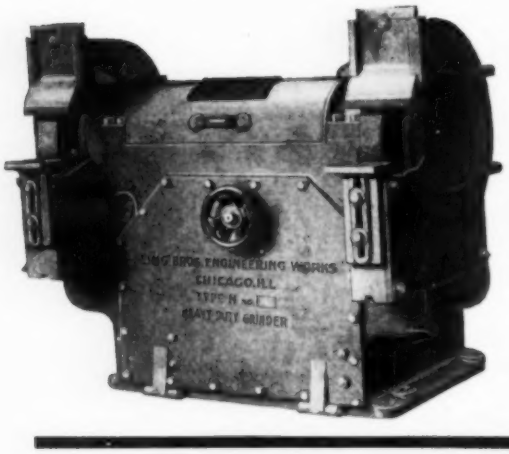
Their Plant Superintendent says: "We bought 3 Kling Grinders in February, 1927 and 3 more in June, 1928. These satisfactory machines are ruggedly built and carry an exceptionally large spindle with 24″ x 3″ x 12″ wheel mounted to stand a peripheral speed of 9000 surface feet per minute.

The first installation of 3 brought a repeat order for 3 more—so Kling High Speed Grinders must be living up to our claims of highest capacity—positive controlled wheel speed—vastly increased production with the same labor now employed—and a quick investment return.

Link-Belt Sprocket Wheel advertising stresses care taken in molding, *grinding*, and construction—Kling Grinders help to make good sprocket wheels for Link-Belt, as they will help to make your castings better.

A recently issued booklet illustrates and describes the Kling Line of superior Grinding Machines. Send for a copy.

Kling High Speed Heavy Duty Grinders are ideal machines for all rough grinding and snagging on steel, malleable and gray iron, and iron and steel forgings.

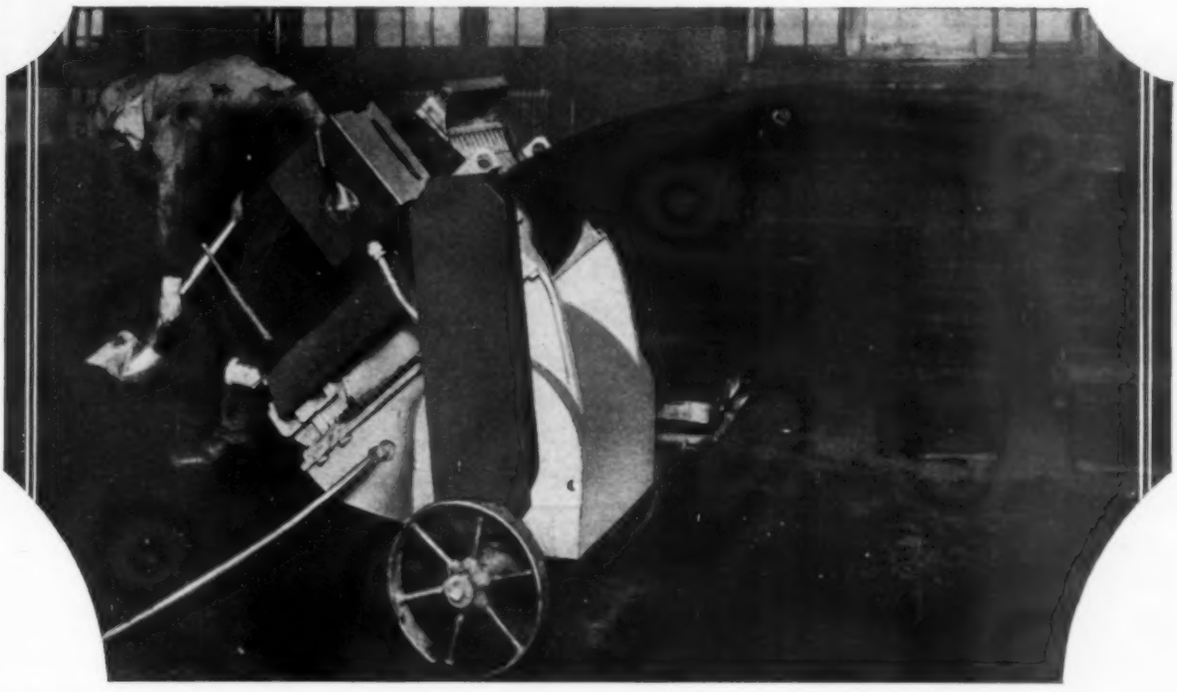


Kling Bros. Engineering Works

HIGH SPEED - HEAVY DUTY GRINDERS

1300-32 NORTH KOSTNER AVE. CHICAGO, ILLINOIS

The ROYER
SAND SEPARATOR AND BLENDER



Endorsed by
Pratt Institute

INVEST IN A ROYER FOR BETTER BLENDED SAND AND INCREASED DIVIDENDS.

MR. PHILIP MILLER OF THE FOUNDRY DEPARTMENT WRITES:

"About a year ago we purchased a Royer Sand Cutter and Blender and are well satisfied with it.

The thing that impresses us most is the uniform blending of the sand which makes it far superior to that cut by hand. It has also greatly reduced losses due to drops and cuts.

Another good feature is the saving in labor necessary to cut over a sand heap. Formerly it took eight men, twenty five minutes to do the job. Now the "Royer" does it in ten minutes.

Our maintenance has been exactly zero except for one repacking with grease of the two rollers. The belt looks good for several years more."

Royer Foundry & Machine Co. Kingston Station **Wilkes-Barre, Pa.**

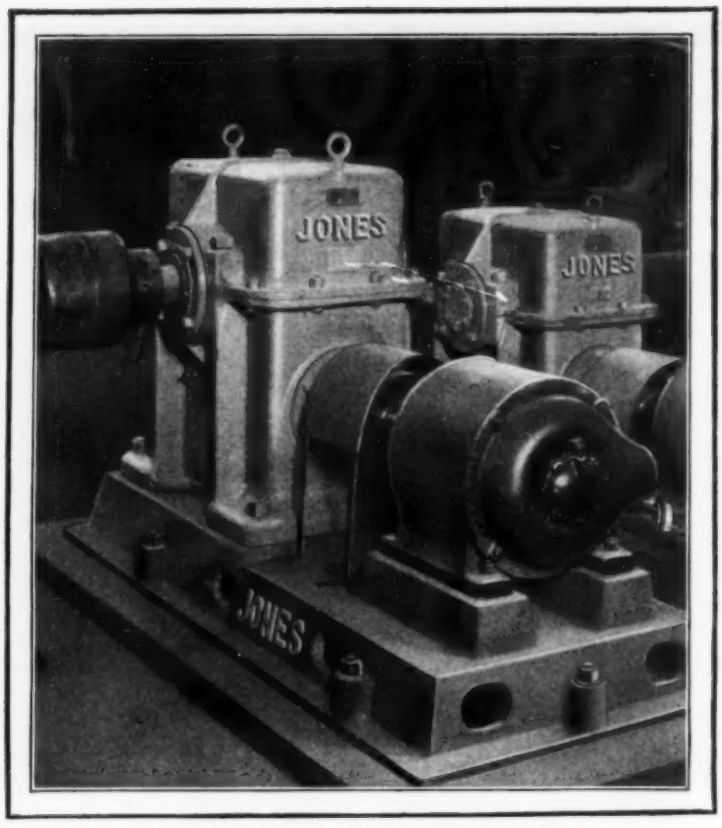
Representatives

Alexander Haigh, Boston, Mass.
David D. Baxter, Rochester, N. Y.
Fenton Foundry Supply Co., Dayton, Ohio, and Detroit, Mich.
Page Sales Service, 608 So. Dearborn St., Chicago, Ill.
Hill & Griffith Co., Birmingham, Ala.
Snyder Foundry Supply Co., Los Angeles, Calif.
Pacific Graphite Works, Oakland, Calif.
Western Foundry Sand Co., Seattle, Wash.

Distributed in Canada by Canadian Foundry Supplies & Equipment, Ltd., Montreal, Que. and Toronto, Ont.
Manufactured in Great Britain by Pneulec Ltd., Smethwick, near Birmingham
Manufactured in France by Fenwick Freres, 8 Rue de Rocroy, Paris

ROYER PRODUCTS RECOMMEND THEMSELVES

THESE Economies IN SPEED REDUCTION are always Sure



Jones Heavy Duty Worm Gear Speed Reducer driving tumbling mills in foundry. Reduction ratio 11½-1.

Your decision to install Jones Worm Gear Speed Reducers is an economy measure. Your installation costs are usually much lower. You transmit more power for less money. Depreciation is a negligible item because there is little wear and tear to a Jones Reducer. The Worm and Worm Gear operate in an always clean oil bath. No dirt or dust can penetrate the protective housing. Upkeep expense can be forgotten, for there is nothing to get out of order. A few times a year refill the oil bath — that's the only attention required.

Valuable production space is saved and released for productive purposes. Danger of injury to workmen is eliminated. Be sure to specify Jones Worm Gear Reducers. Their operating economy far more than offsets their cost.

W. A. JONES FOUNDRY & MACHINE COMPANY

Main Office and Works: 4401 W. Roosevelt Rd., Chicago

Branch Sales and Engineering Offices:

New York Cleveland Milwaukee Pittsburgh Buffalo Detroit Birmingham
St. Louis Cincinnati Kansas City, Mo. Los Angeles San Francisco

Jones WORM-GEAR Speed Reducers

TIMKEN EQUIPPED

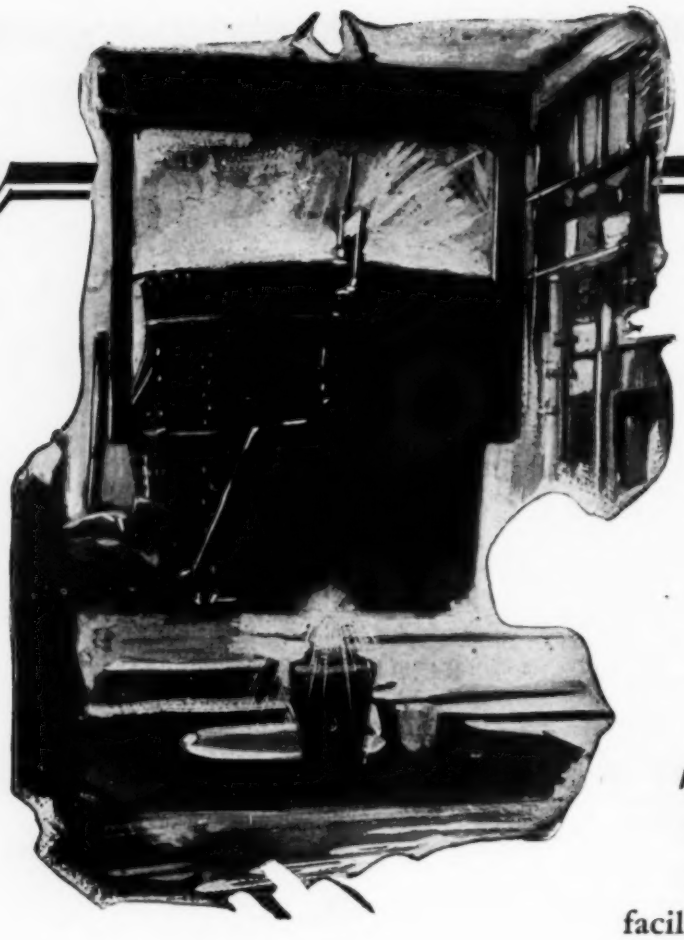
IT gives me keen pleasure to extend to you on behalf of myself and my associates, all the season's best wishes and the hope that the New Year will hold for you much happiness and a fuller measure of achievement.

H. S. Simpson.
President

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING 549 W. WASHINGTON BLVD.

CHICAGO, ILL., U. S. A.



Complete Ferro Alloy Service

THE Electro Metallurgical Sales Corporation offers a complete line of Ferro Alloys. We have ample facilities for meeting every requirement for any or all of the alloys listed.

Stocks are available for prompt shipment of grades and sizes most suitable for general steel practice.

Special requirements receive prompt and careful attention.

Our Service Department is maintained to demonstrate the proper use and benefits to be derived from these alloys.

CHROMIUM
- High Carbon Ferrochrome (maximum 6% carbon)
- Low Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
- Chromium Metal
- Chromium-Copper
- Miscellaneous Chromium Alloys

MANGANESE
- Standard Ferromanganese 78 to 82%
- Low Carbon Ferromanganese
- Medium Carbon Ferromanganese
- Manganese Metal
- Manganese-Silicon (Silico-Manganese)
- Manganese-Copper
- Miscellaneous Manganese Alloys

SILICON
- Ferrosilicon 15%
- Ferrosilicon 50%
- Ferrosilicon 75%
- Ferrosilicon 80 to 85%
- Ferrosilicon 90 to 95%
- Refined Silicon (minimum 97% silicon)
- Calcium-Silicon
- Calcium-Manganese-Silicon
- Calcium-Aluminum-Silicon
- Silicon-Copper
- Silico-Manganese (Manganese-Silicon)
- Miscellaneous Silicon Alloys

VANADIUM
- All Grades

ZIRCONIUM
- Silicon-Zirconium
- Zirconium-Ferrosilicon

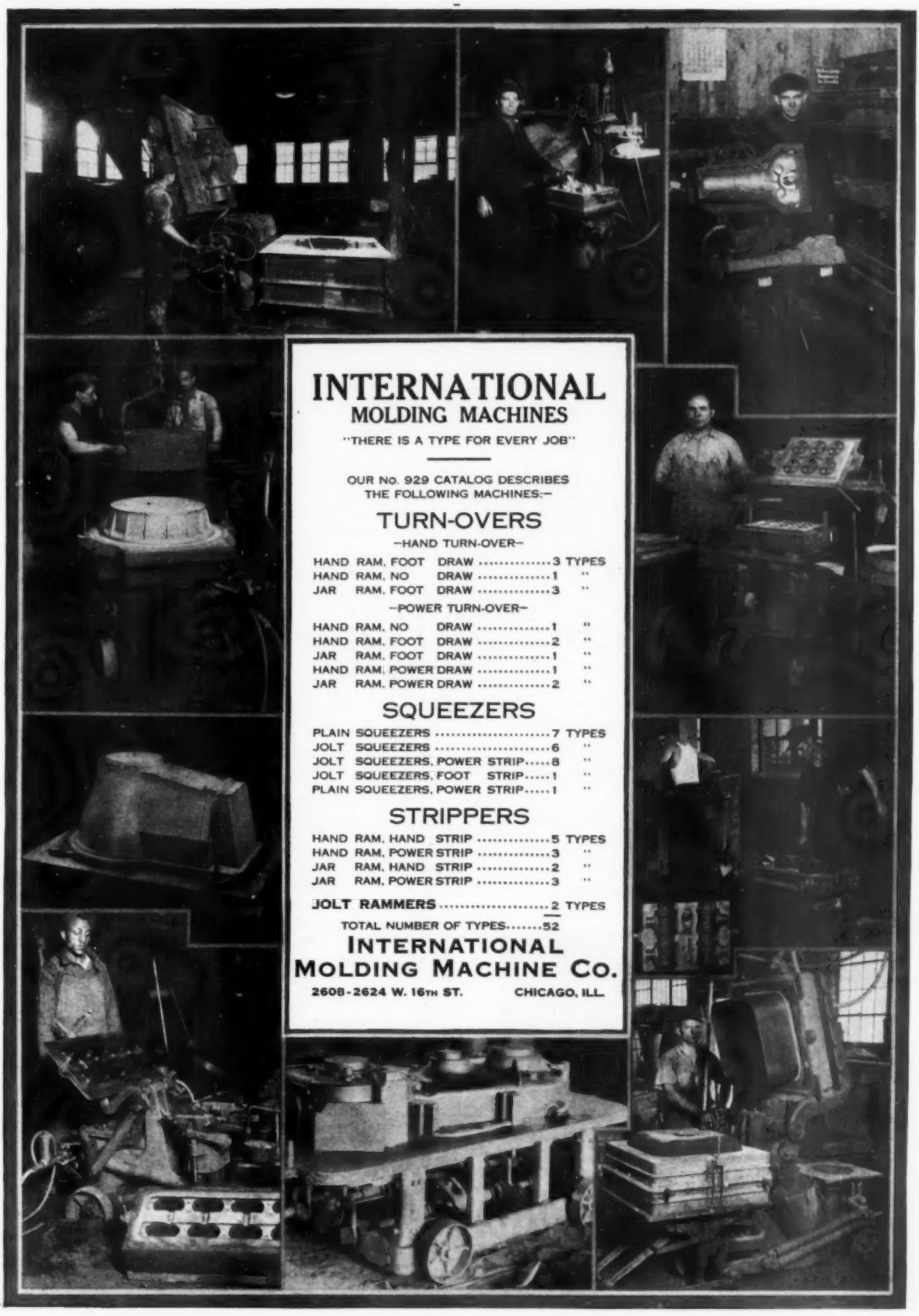
Electromet
Ferro-Alloys & Metals

Sole Distributors

ELECTRO METALLURGICAL SALES CORPORATION

Unit of Union Carbide UCC *and Carbon Corporation*

Carbide and Carbon Building: 30 East 42d St., New York



INTERNATIONAL
MOLDING MACHINES

"THERE IS A TYPE FOR EVERY JOB"

OUR No. 929 CATALOG DESCRIBES
THE FOLLOWING MACHINES:—

TURN-OVERS

—HAND TURN-OVER—

HAND	RAM, FOOT	DRAW	3	TYPES
HAND	RAM, NO	DRAW	1	"
JAR	RAM, FOOT	DRAW	3	"

—POWER TURN-OVER—

HAND	RAM, NO	DRAW	1	"
HAND	RAM, FOOT	DRAW	2	"
JAR	RAM, FOOT	DRAW	1	"
HAND	RAM, POWER	DRAW	1	"
JAR	RAM, POWER	DRAW	2	"

SQUEEZERS

PLAIN	SQUEEZERS	7	TYPES
JOLT	SQUEEZERS	6	"
JOLT	SQUEEZERS, POWER STRIP	8	"
JOLT	SQUEEZERS, FOOT STRIP	1	"
PLAIN	SQUEEZERS, POWER STRIP	1	"

STRIPPERS

HAND	RAM, HAND STRIP	5	TYPES
HAND	RAM, POWER STRIP	3	"
JAR	RAM, HAND STRIP	2	"
JAR	RAM, POWER STRIP	3	"

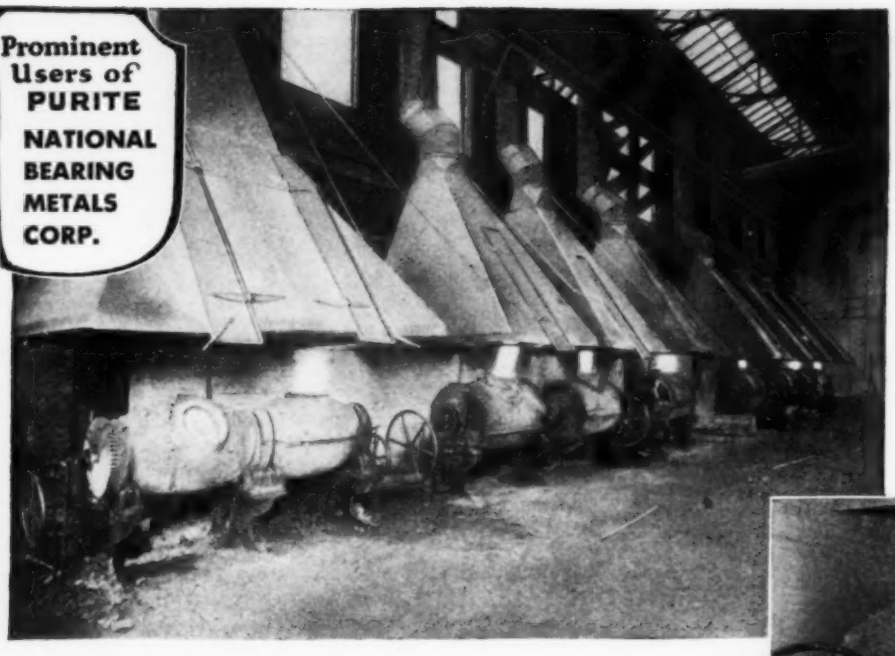
JOLT RAMMERS ..... 2 TYPES

TOTAL NUMBER OF TYPES..... 52

INTERNATIONAL MOLDING MACHINE CO.

2608-2624 W. 16TH ST. CHICAGO, ILL.

Prominent Users of PURITE
NATIONAL BEARING METALS CORP.



Two types of non-ferrous melting furnaces in which PURITE *is being used throughout the country.*

(Courtesy National Bearing Metals Corp.)

Non-Ferrous Melters turn

Losses into *Profits*... with PURITE

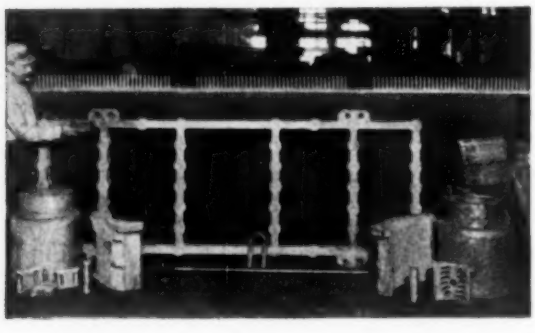
Melting losses going up in smoke or out in dross in the non-ferrous industry in America run up into millions of dollars annually. Other millions are lost from defective castings caused by impurities which proper fluxing would eliminate.

Hundreds of foundries, refineries and other non-ferrous melters are turning these losses into profits by using PURITE. One foundry reports a saving in metal shrinkage and defective castings of more than $50,000 a year, while another heavy melter of yellow brass advises of a reduction of more than 50% in metal shrinkage with the use of PURITE as a slag covering bath.

PURITE offers these distinct advantages in non-ferrous metallurgy:

(1) It serves as a covering bath, protecting the metal from oxidation, absorption of gases and other impurities and further reduces metal losses caused by volatilization at higher temperatures; (2) PURITE absorbs sulphur, arsenic, antimony and other impurities from the metal during melting; (3) PURITE decomposes dross normally formed in many brass melting operations, returning the metal to the bath. This last action alone would effect enormous gross savings if PURITE were used throughout the entire industry.

We recommend our new bulletin No. 308—"PURITE in Non-Ferrous Metallurgy"—for your careful consideration.



Various castings produced by National Bearing Metals Corp. who use PURITE *or soda ash in all of their plants.*

The MATHIESON ALKALI WORKS (Inc.)
250 PARK AVENUE NEW YORK CITY
PHILADELPHIA CHICAGO PROVIDENCE CHARLOTTE ST. LOUIS CINCINNATI

If It's A Herman It's Worth Using. It Made Its Way by the Way it's Made

The design of our Jarr Independent Rollover and Pattern Drawing Machines is such that we can furnish these machines to meet your requirements on both large and medium work.

We would be pleased to have you send us your inquiries and let our Service Department advise with you on your molding machine requirements.

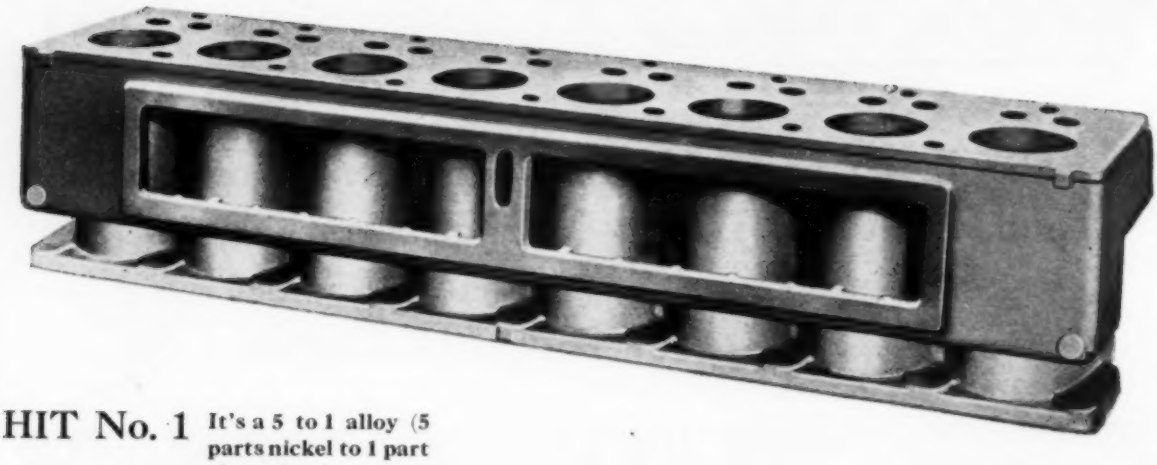
Herman Pneumatic Machine Company

GENERAL OFFICES: Union Bank Building PITTSBURGH, PA.

MANUFACTURING PLANT: ZELIENOPLE, PENNSYLVANIA, U. S. A.

Foreign Works: Pneulec Limited, Mafeking Rd., Smethwick, near Birmingham, England.
Gibson Battle & Co., Limited, Sydney, N. S. W.

"Hitting on all 8"



HIT No. 1 It's a 5 to 1 alloy (5 parts nickel to 1 part chromium)

HIT No. 2 Refines the grain

HIT No. 3 Increases hardness

HIT No. 4 Increases hardness to wear

HIT No. 5 Improves machine-ability

HIT No. 6 Reduces Brittleness

HIT No. 7 Reduces porosity

HIT No. 8 Increases strength

When a product demonstrates its ability to help a man's business—other men adopt it—it is then termed a HIT.

"Nichromized"* iron is "hitting on all 8" in modern foundries, and as a result these foundries are supplying better castings with fewer rejects.

The above picture shows an eight cylinder casting made by Universal Foundry Company of Oshkosh, Wisconsin. Here again "Nichrome" B is hitting on all 8 advantages.

*"Nichrome" B, the 5 to 1 nickel-chromium alloy, comes in shot form and is easy to use—just add it to the ladle.

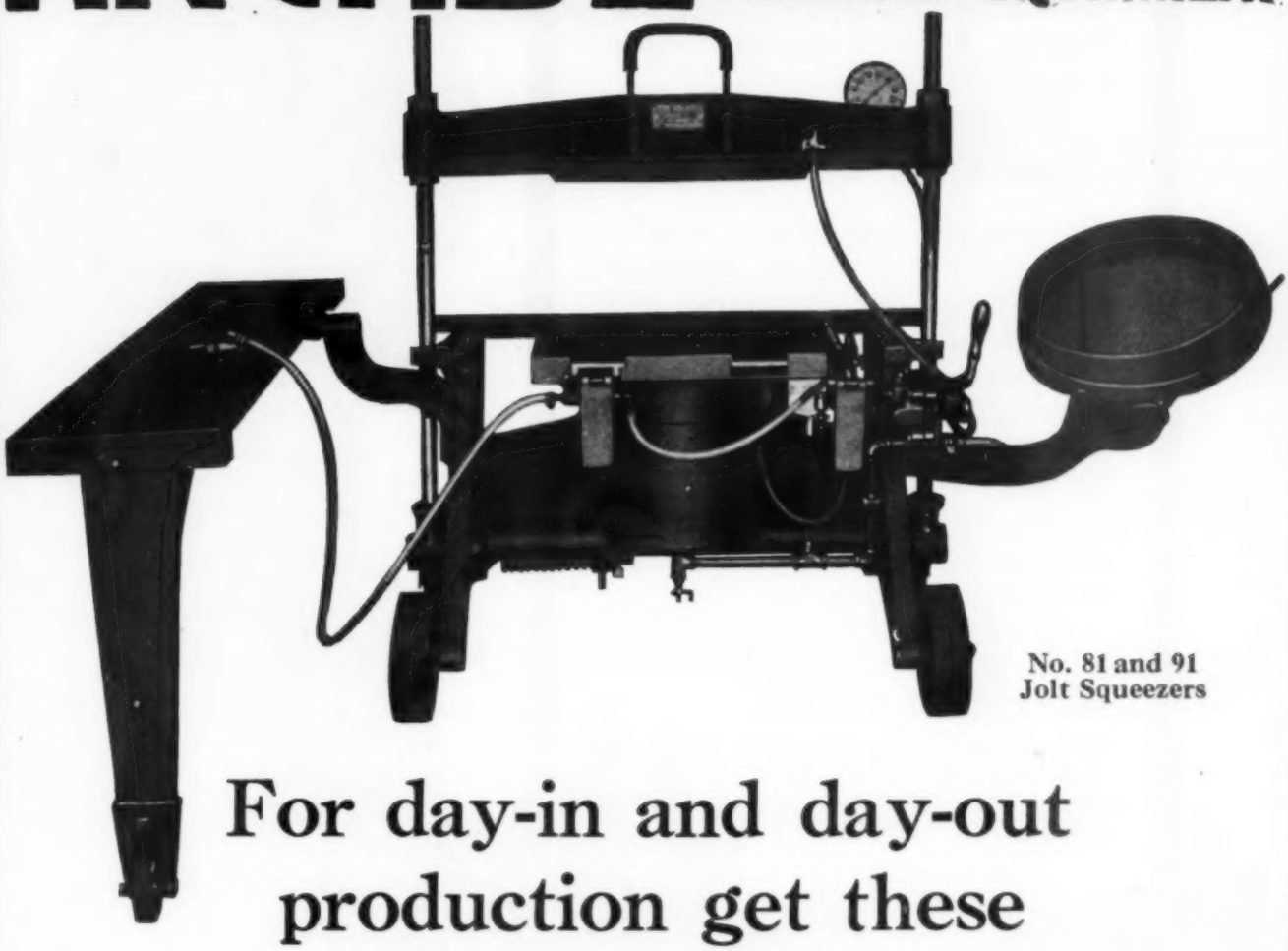
DRIVER-HARRIS COMPANY
HARRISON, NEW JERSEY
Chicago - Detroit - Morristown, N. J. - England - France
Cleveland Italy

DISTRIBUTORS
Debevoise-Anderson Company
New York Boston Philadelphia
Rogers, Brown & Crocker Bros. Inc.
Cincinnati Chicago Cleveland Pittsburgh St. Louis
H. L. E. Meyer, Jr. & Co.
San Francisco, Los Angeles, Cal.

CAST IRON
with Nichrome GRADE B addition
CAST IRON

Tougher—Stronger—Harder—Yet Easily Machined

ARCADE MOLDING MACHINES AND FOUNDRY EQUIPMENT



No. 81 and 91
Jolt Squeezers

For day-in and day-out production get these sturdy machines.

They Stand the Gaff!

Specifications	No. 81	No. 91	No. 13-J S
Distance between uprights	32″	36″	38″
Diameter Jolt cylinder	3″	4″	5″
Diameter Squeeze cylinder	8½″	10″	13″

Ask for Bulletin 31-C

Ask for prices — — no obligation

Arcade Manufacturing Company Freeport, Illinois U. S. A.

*3

Every Year..

the centrifugal principle for foundry blowers receives wider recognition.

Spencer Turbo-Compressors

for foundries are not only centrifugal—but multistage—and slow speed with wide clearances and low maintenance costs. For more than a decade, the Spencer Principles of Design have withstood the grind and helped bring down satisfactory melts in hundreds of foundries. There are many reasons for this record—let us send you all the facts.

THE SPENCER TURBINE CO.

Hartford, Connecticut

Mayari in two forms

—Standard Mayari

—Silvery Mayari

Mayari, a low phosphorus and low sulphur pig iron containing nickel, chromium, and a small percentage of vanadium and titanium, besides the elements usually found in iron, is now available in two forms—Standard Mayari and Silvery Mayari. Unlike other alloys, Mayari is a natural product, the elements being intimately mixed in the native ore. The percentage of chromium to nickel is in the ratio of two to one. This ratio, besides being a natural one, has been found through years of experience in the manufacture of all types of castings, to give the most satisfactory results.

Standard Mayari is produced with a range of silicon of from 0.75 per cent to 2.50 per cent which permits its use in making various kinds of castings, ranging from the hard white to the soft gray irons. The range of manganese varies from 0.80 per cent to 1.50 per cent, depending upon the amount of silicon, with phosphorus at 0.10 per cent and sulphur at 0.05 per cent, maximum.

Silvery Mayari has been developed by Bethlehem for use in making castings where large quantities of steel scrap are used. This newer form of Mayari has a silicon content ranging from 7.00 per cent to 10.00 per cent with manganese from 2.00 per cent to 3.00 per cent. The proportion of chromium to nickel is in the same natural ratio of two to one as in Standard Mayari, but with a slightly reduced content of these metals to offset the hardening effect of chromium when Silvery Mayari is used in larger proportions than Standard Mayari.

Although it has been on the market but a comparatively short time, Silvery Mayari has won wide favor among the foundry trade. Its merits as a means of carbon control, eliminating high metallurgical costs in making super-strength castings, is fast creating a heavy demand.

A Bethlehem foundry specialist will gladly discuss the application of Mayari to the castings you make or use. Send for Booklet 54-A which fully describes Silvery Mayari and its applications.

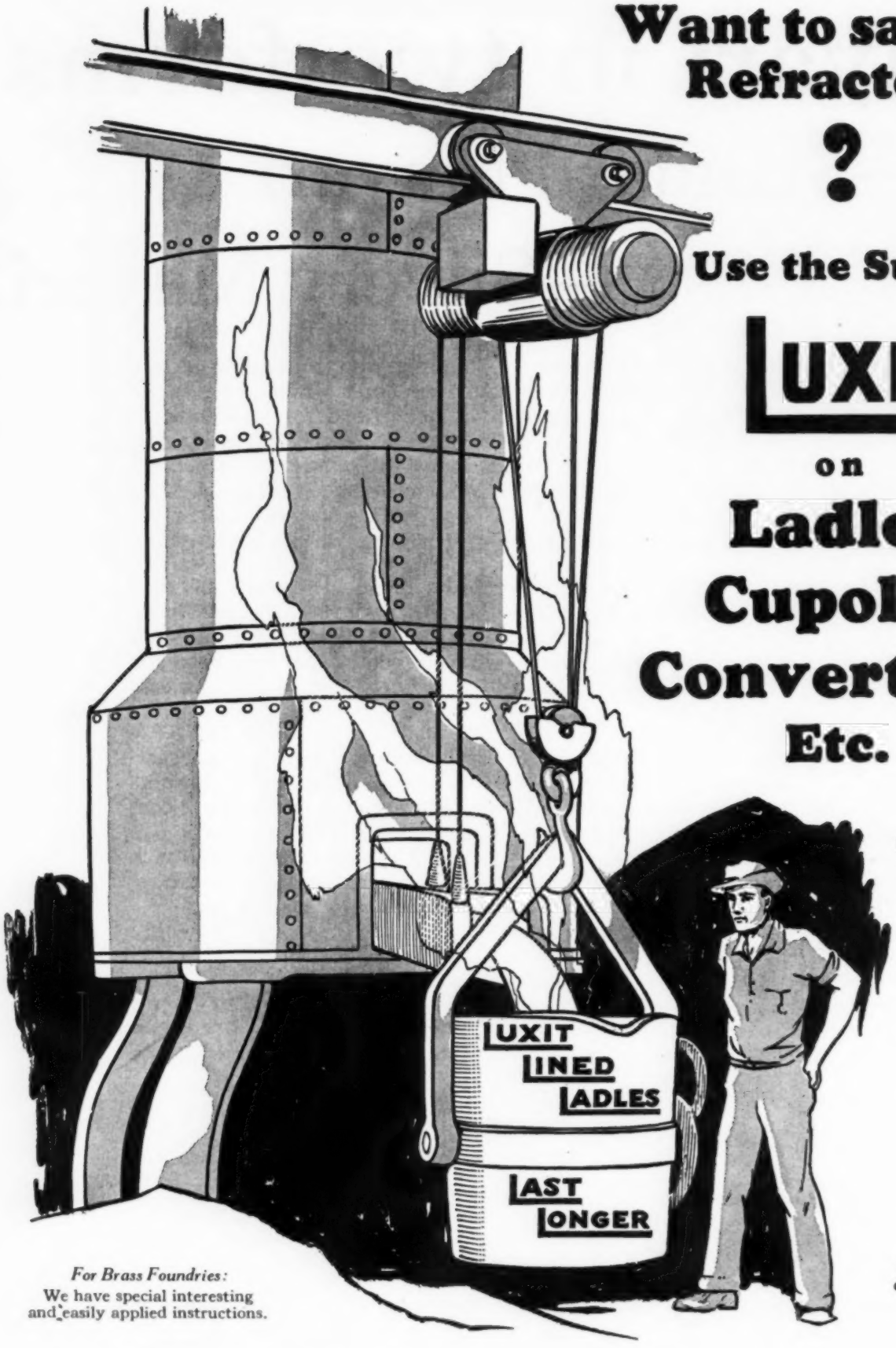
Bethlehem Steel Company, *General Offices*, Bethlehem, Pa. *District Offices:* New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, Honolulu. *Bethlehem Steel Export Corporation, 25 Broadway, New York City. Sole Exporter of our Commercial Products.*

BETHLEHEM

Producer of MAYARI

Want to save on Refractory ?

Use the Superior LUXIT on Ladles Cupolas Converters Etc.



Easy application. Maintenance reduced

—o—

Investigate for yourself.

—o—

Depot near you

—o—

Fusion above 3300° F.

—o—

Ask for particulars

—o—

Luxit is shipped dry to save freight on water.

For Brass Foundries:
We have special interesting and easily applied instructions.

The Alpha-Lux Co., Inc.

192 Front Street

New York City

The Titanium Alloy Manufacturing Co.

Niagara Falls, N. Y., U. S. A.

BRANCH OFFICES:

60 John Street
New York City

Oliver Building,
Pittsburgh

Keith Building
Cleveland

FERRO CARBON
Reg. U.S.Pat. OFFICE TRADE MARK
F.C.T.
TITANIUM

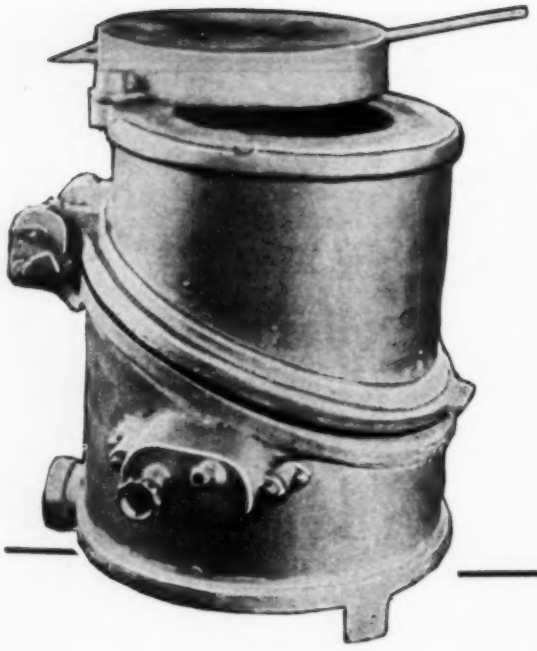
AGENCIES:

Pacific Coast

Balfour, Guthrie & Co.—San Francisco, Los Angeles, Portland, Seattle, Tacoma Vancouver, B. C.

Great Britain & Europe

T. Rowlands & Co., Ltd.—Sheffield, Eng.



The ILER Draw Crucible Furnace

—Saves— Labor and Crucibles

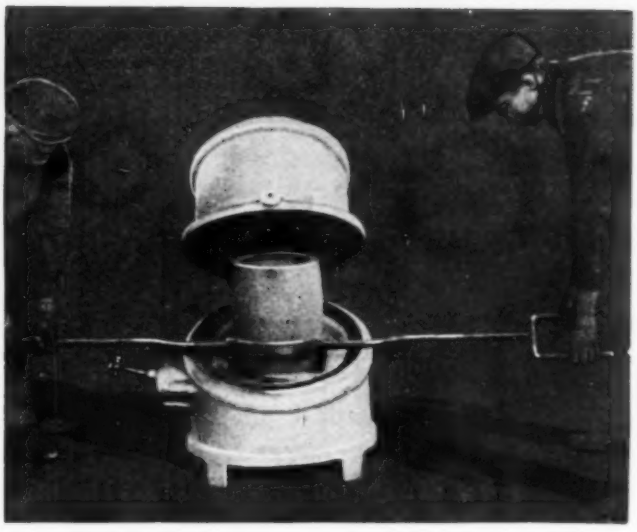
For melting Aluminum, Brass, Bronze and Monel Metal.

The Iler makes the handling of crucibles a much faster and easier operation—and the life of crucibles is prolonged through the use of an open side shank in place of tongs.

AIR PRE-HEATING FEATURE SPEEDS UP MELTING AND REDUCES FUEL COST.

The ILER Furnace is built in sizes—35, 50, 60, 70, 80, 90 and 125, and uses standard crucibles of corresponding number.

Investigate! Write for bulletin.



The Aluminum Foundry Equipment Co.

318 Plymouth Bldg., Cleveland, Ohio

21 East 40th St., New York City

POTS for Aluminum, Lead and White Metal Melting

ALUMET Pots Last!

Alumet Pots are cast from a special analysis of iron to resist heat and effect of aluminum melting. They are very close in grain, have no porous spots and do not scale readily.

If you will send us a pattern or blue print, we will supply you with the desired pot.

100 Drags 22″x66″x10½″ in 7½ Hours

with three men on the machine—shoveling their own sand

TABOR PRODUCTS COMBINE } High Speed with Safety
Low First Cost with Minimum Maintenance

Consult TABOR! Profit by their experience—

for **forty-one** years the leading producers of molding machines

Jar Roll-over and Pattern Drawing Machines are standard in the sizes shown:

22″ x 32″ table—10″ Pattern Draw, 600 lbs. capacity.
30″ x 40″ table—12″ Pattern Draw, 1000 lbs. capacity.
36″ x 50″ table—15″ Pattern Draw, 1600 lbs. capacity.
36″ x 50″ table—15″ Pattern Draw, 2000 lbs. capacity.
36″ x 50″ table—15″ Pattern Draw, 2400 lbs. capacity.
36″ x 50″ table—15″ Pattern Draw, 2900 lbs. capacity.

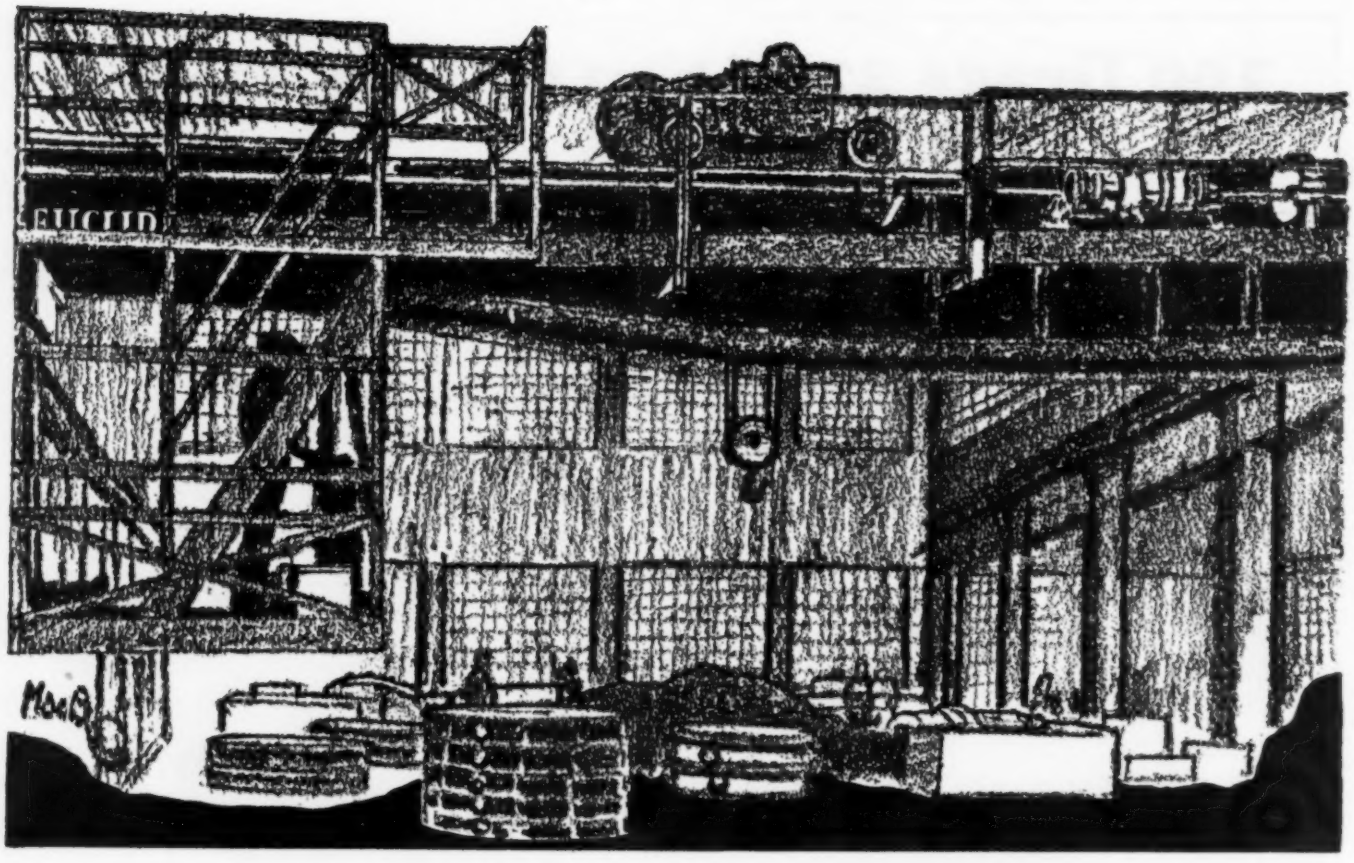
THE TABOR MANUFACTURING COMPANY
6225 TACONY STREET : PHILADELPHIA : PENNA.

Western Representatives:

Northern California: PACIFIC GRAPHITE WORKS, Oakland, Cal. *Southern California:* SNYDER FOUNDRY SUPPLY CO., Los Angeles, Cal.

Foreign Representatives:

Great Britain and Ireland: MACNAB & CO., 56 Eagle St., Southampton Row, London, Eng. *Japan:* MITSUI & CO., Tokio, Japan
European Continent: F. G. KRETSCHMER CO., Frankfort, A. M., Germany



ENGINEERING LEADERSHIP
a Guarantee of Performance Ability

FOR years Euclid engineers have made extensive studies of conveying problems and conditions in industrial plants the country over. Thus the design and construction of Euclid Cranes has been based on first-hand knowledge of the gruelling tests and terrific load-bearing strains under which a crane must operate.

The rugged stamina and brute ability of Euclid Cranes and Hoists is delivered by the use of heavier construction—larger gears and greater journal bearing surfaces. The one-third fewer parts in Euclid Hoists emphasize their practical benefits in less liability of breakdowns—fewer tie-ups in production—lower repair bills and reduced operating costs.

These superior features impart to Euclid Cranes and Hoists super-strength to perform the toughest tasks—the ability to deliver 100% year in and year out. They are a guarantee of performance ability under the exacting tests of severe service. They express Euclid engineering leadership in crane and hoist building.

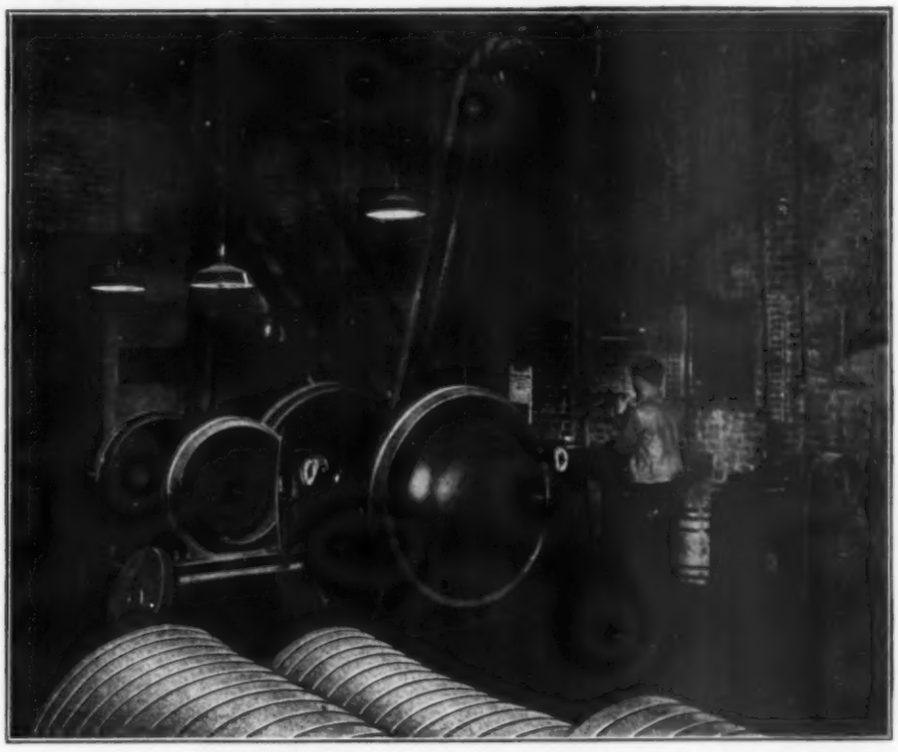
THE EUCLID CRANE & HOIST CO., EUCLID, OHIO

EUCLID

CRANES HOISTS

"Raise Profits"

Thirty-seven years behind the wheel...



On these testing machines, developed and patented by our own engineers, SAFETY Grinding Wheels are given whirling tests at 150% of their rated maximum speed.

FROM a voice barely distinguishable in the din of industry to a giant that reverberates in shops and factories as countless as the flying sparks . . . that's the story of The Safety Grinding Wheel and Machine Company since its beginning 37 years ago.

When our growing pains let up, we decided to gouge out a front-rank place for ourselves. We did . . . we got "years ahead." Then we dug deep into the gray matter. With our hard pates to the grindstone we produced "The SAFETY Collar System." That saved so many lives we decorated our chests with two honors . . . the first motor-driven portable grinder . . . and the amazing "Rite-Speed" machine which gives you a robot type of service.

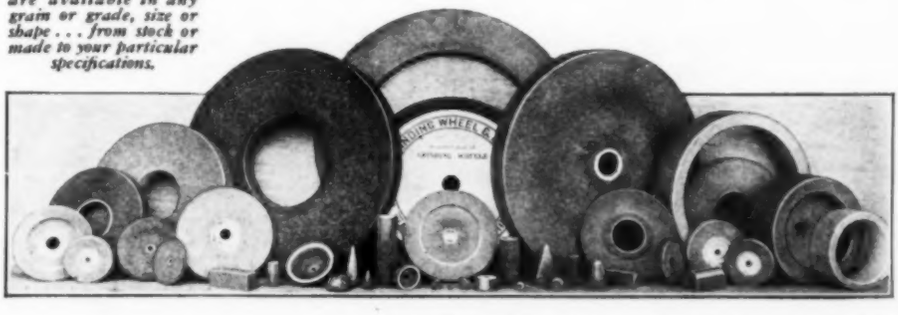
Then a tough hombre came out with a metal as hard as two first sergeants. But we ground it! And when manufacturers went "dizzy" over speed, we prescribed the remedy . . . "Safe-T-Bond" high-speed wheels.

Problems? No matter what size or shape they are, shoot 'em on. We've got the answer book . . . crammed full of experience.

Get the "proof of the pudding!" Won't you put us to the test? If *you* have a tough grinding problem, let us tackle it. Let us tell you about the "Rite-Speed" and the "DeLuxe" Portable Grinders. Get the facts about "Safe-T-Bond" high-speed wheels. The coupon is for your convenience. Just pin it to your letterhead and mail it . . . today.

The Safety Grinding Wheel & Machine Company
2336 Columbus Ave., Springfield, Ohio

Safety Grinding Wheels are available in any grain or grade, size or shape . . . from stock or made to your particular specifications.



The Safety Grinding Wheel & Machine Co.,
2336 Columbus Ave., Springfield, Ohio.
I would like to know more about
- ☐ SAFETY "Rite-Speed" Grinders
- ☐ SAFETY "DeLuxe" Portable Grinder
- ☐ "Safe-T-Bond" High-Speed Wheels

.....
(name)

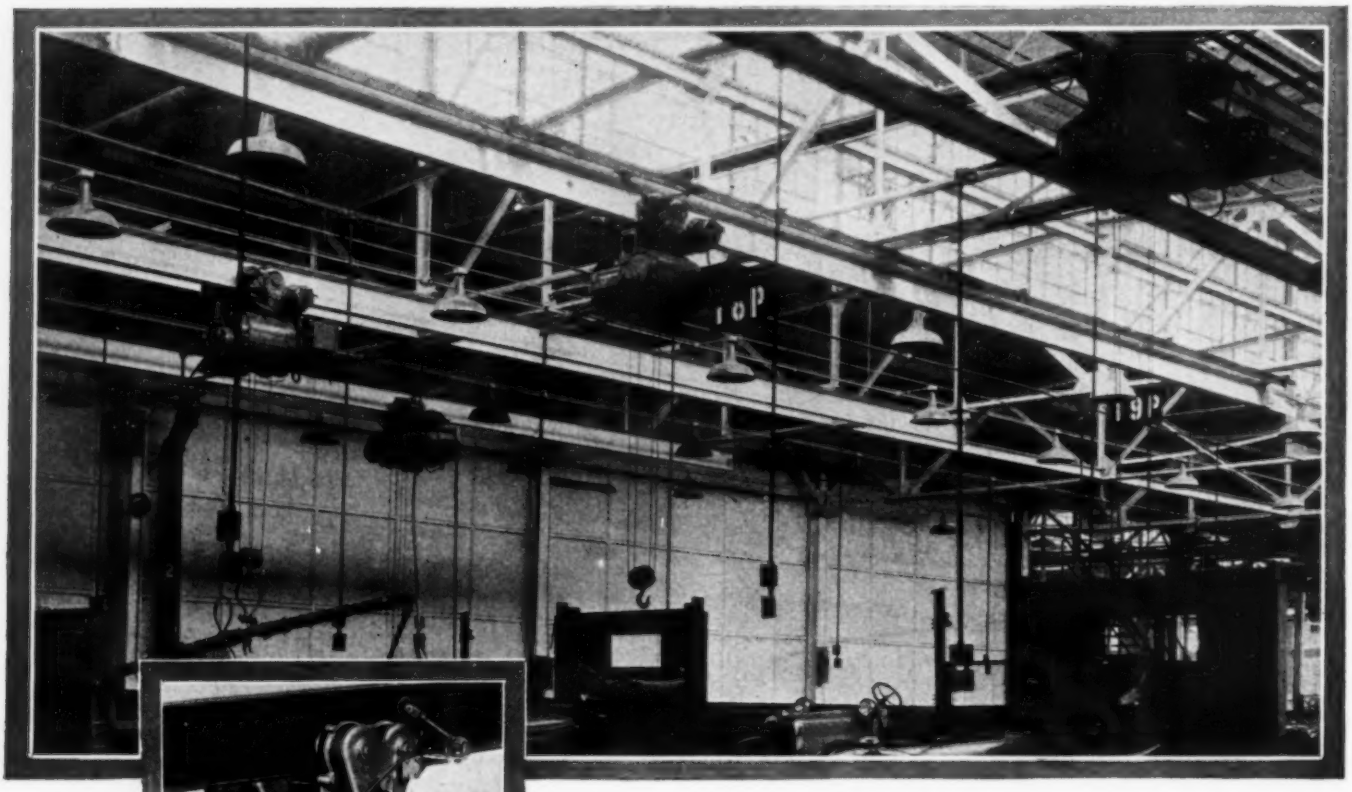
.....

Pin this to your letterhead

Hyatt Endurance in every LO-HED Hoist

The durability, ease of operation, and economy of LO-HED Hoists, wherever installed, are in no small measure due to the stamina and free-rolling qualities of Hyatt Roller Bearings.

In the popular Class "A" LO-HED, illustrated, Hyatts help speed up production, while guarding against interruptions common with poor bearings.



Class "A" LO-HED Hoist with Motor Trolley, one-ton capacity, all four wheels driving wheels. Built, and completely protected with Hyatt Roller Bearings, by the American Engineering Co., Philadelphia, Pa.

The inherent ruggedness of Hyatt Roller Bearings withstands the stress of frequent starts and stops. By diminishing friction, Hyatts also prevent jerky operation. Loads are easily and accurately controlled at all times.

Year after year, Hyatts carry the burden of continuous operation, with no perceptible wear . . . and reduce attention to infrequent lubrications.

In every overhead handling operation . . . in trolleys, cranes and hoists of every description . . . Hyatt protection is your assurance of permanent satisfaction.

HYATT ROLLER BEARING COMPANY

Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

A Talking Moving Picture

Which translated from the language of the "talkies" means:—

Clark Tructractors are gasoline powered, competent for 24 hours' continuous service, and just as potent in the last hour as the first. Moving materials with this equipment is Talking in terms of Low Costs and Greater Profit.

Send This Coupon

Clark Tructractor Co.,
Battle Creek, Mich.

Please send information on Clark Tructractors.

Name .....

Company .....

Address .....

F-12-15 29

CLARK TRUCTRACTORS
Reg. U. S. Pat Office

Clark Tructractor Co., Battle Creek, Mich.

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ABRASIVE BRICKS—Rubbing
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

ABRASIVE FILES
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

ABRASIVE WHEELS
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Safety Grinding Wheel & Machine Co., Springfield, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

ABRASIVES—Metallic Sandblast
American Steel Abrasives Co., Galion, O.
Globe Steel Abrasive Co., Dept. F., Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly W W., Mfg Co., 4702 Train Ave., Cleveland, O.
Steelmast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

ACETYLENE
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.

ACETYLENE DISSOLVED or in Cylinders
Prest-O-Lite Co., Inc., 30 E. 42nd St., New York City.

ACETYLENE Generators
Oxweld Acetylene Co., Newark, N. J.

AIR COMPRESSORS
Bury Compressor Co., 1746 Cascade St., Erie, Pa.
General Electric Co., Schenectady, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.

AIR CONDITIONING Equipment
Pangborn Corp., Hagerstown, Md.

AIR SEPARATORS—See Separators—Air, Moisture, Oil

AIR TOOLS—See Tools—Pneumatic

ALKALI
Mathieson Alkali Works, Inc., 250 Park Ave., New York City.

ALLOYS
Driver-Harris Co., Harrison, N. J.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood St., Buffalo, N. Y.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

ALLOYS—Boronic
American Boron Products Co., Inc., Ramadell & Elmwood Ave., Buffalo, N. Y.

ALUMINUM
British Aluminium Co., 122 E. 42nd St., New York City.

ALUMINUM—Alloys and Ingots
British Aluminum Co., 122 E. 42nd St., New York City.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood St., Buffalo, N. Y.

ANCHORS
Paul & Beekman Manufacturing Co., 1722 N. Fifth St., Philadelphia, Pa.

ANNEALING OVENS—See Ovens—Annealing

ARC WELDING EQUIPMENT
General Electric Co., Schenectady, N. Y.

ARCHITECTS—Industrial
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

ARRESTORS & COLLECTORS—Dust—See Dust Arresting and Collecting Systems

BABBITT METAL
Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.

BAND SAWS—See Saws—Metal Band

BANDS, SNAP FLASK—Steel
Adams Co., The, 175 Foster St., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

BARROWS—Foundry
Sterling Wheelbarrow Co., Milwaukee, Wis.

BARS—Iron and Steel
Bethlehem Steel Co., Bethlehem, Pa.

BEARINGS—Crane
Hyatt Roller Bearing Co., Harrison, N. J.

BEARINGS—Hoist
Hyatt Roller Bearing Co., Harrison, N. J.

BEARINGS—Roller
Hyatt Roller Bearing Co., Harrison, N. J.

BEARINGS—Steel Mill—Equipment
Hyatt Roller Bearing Co., Harrison, N. J.

BEARINGS—Trolley
Hyatt Roller Bearing Co., Harrison, N. J.

BELLOWS—Molders
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.

BENCHES—Molders
Western Tool & Mfg. Co., The, Springfield, Ohio.

BINDERS—See Core Binders

BLACKING MIXTURE
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third St., Detroit, Mich.

BLAST METERS
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.

BLOCKS—Chain
Box Crane & Hoist Corp., 2226 Ontario St., Philadelphia, Pa.
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.

BLOW COCKS
Adams Co., The, 175 Foster St., Dubuque, Iowa.

BLOWERS
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
General Electric Co., Schenectady, N. Y.
Knickerbocker Co., The, Jackson, Mich.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Spencer Turbine Co., Hartford, Conn.

BLOWPIPES—Brazing, Cutting, Welding, etc.
Oxweld Acetylene Co., Newark, N. J.

BLUE POTS—Patternshop
General Electric Co., Schenectady, N. Y.

BOLTS AND NUTS
Bethlehem Steel Co., Bethlehem, Pa.
Bourne-Fuller Co., 1912 Scranton Rd., Cleveland, O.

BOOKS—Technical
Penton Publishing Co., Cleveland, O.

BOTTOM PLATES—Steel
Adams Co., 175 Foster St., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.
Truscon Steel Co. (Pressed Steel Div.), Youngstown, O.
Wadsworth Core Machine & Equipment Co., Akron, O.

BOXES—Tote
Sterling Wheelbarrow Co., Milwaukee, Wis.

BRIDGES & BUILDINGS—Steel
American Bridge Co., 71 Broadway, New York City.

BRONZE—Manganese
Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.

BRUSHES
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

BRUSHES—Motor and Generator
General Electric Co., Schenectady, N. Y.
United States Graphite Co., Saginaw, Mich.

BRUSHES—Wire
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

BUCKET CARRIERS
Chain Belt Co., 273 Park St., Milwaukee, Wis.

BUCKET CARRIERS—Pivoted
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

BUCKET LOADERS FOR Sand Mills
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

BUCKETS
Penn Foundry & Mfg. Co., Reading, Pa.

BUCKETS—Clam Shell, Drag Line, Grab
Brosius, Edgar E., 19th St. & P. R. R., Sharpsburg P. O., Pittsburgh, Pa.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Whiting Corp., The, Harvey, Ill.
Williams, G. H., Co., 611 Haybarger Lane, Erie, Pa.

BUCKETS—Elevating
Chain Belt Co., 273 Park St., Milwaukee, Wis.

BUFFING COMPOSITIONS
Stevens, Frederic B., Inc., Larned and Third St., Detroit, Mich.

BUILDING—Foundry, Factory, Industrial
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

BUILDING—Steel
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.

BURNERS—Acetylene—See Torches and Burners—Acetylene, Blow, Oxy-Acetylene

BURNERS—Oil or Gas
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland, O.
Hauck Manufacturing Co., 126 Tenth St., Brooklyn, N. Y.

BUSHINGS—Flask Pins
Michigan Screw Co., Lansing, Mich.

CAR PULLERS—Electric Capstan
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

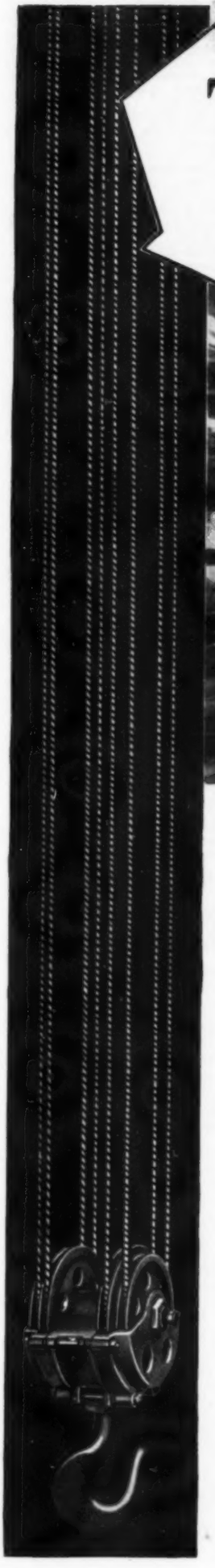
CARBON BURNING Apparatus
Oxweld Acetylene Co., Newark, N. J

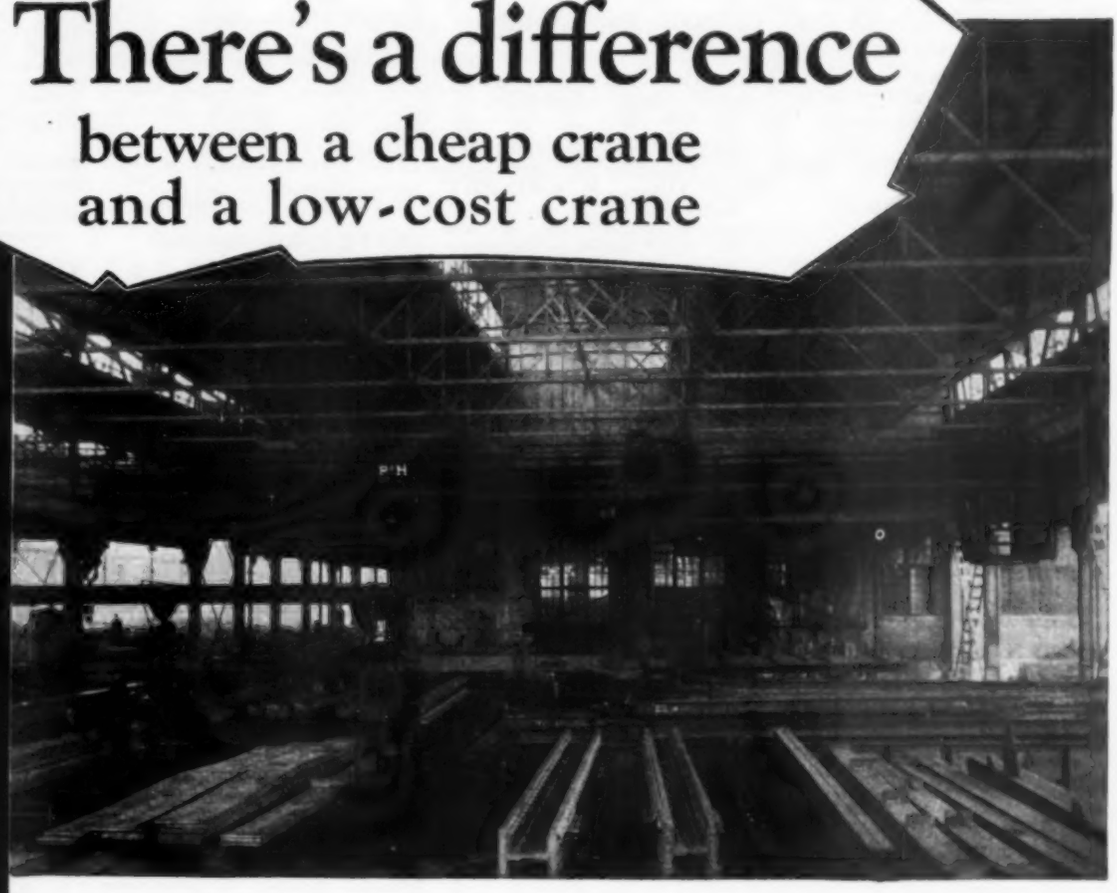
CARBON RODS AND Paste for Welding
Oxweld Acetylene Co., Newark, N. J.

CARS—Annealing, Billet Furnace Charging, Core Oven, Pig iron
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland, O.

There's a difference

between a cheap crane and a low-cost crane



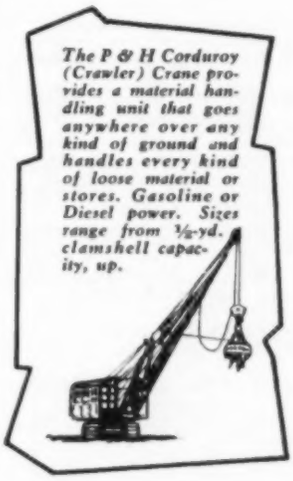


THE real cost of a crane is not only the price you pay when you buy it but it includes cost of operation and maintenance over a period of years.

You can buy other cranes for less money than a P&H but you are not saving money unless these cranes operate as economically and with as few shut-downs as the P&H.

A cheap crane is cheap for the reason that it hasn't the same excellent workmanship and materials that a P&H has and can't possibly operate as economically and dependably.

Crane service must be dependable. A low-priced crane is apt to be shut down just when it is needed most, thereby causing a production loss many times greater than the original saving in first cost.



The P & H Corduroy (Crawler) Crane provides a material handling unit that goes anywhere over any kind of ground and handles every kind of loose material or stores. Gasoline or Diesel power. Sizes range from ½-yd. clamshell capacity, up.

If the price of a P&H Crane were multiplied by two, it would in many cases be a better buy.

Most industrial plants realize this and for this reason there are more P&H Electric Traveling Cranes in service than any other make.

HARNISCHFEGER CORPORATION
Established in 1884
Crane and Hoist Division
3805 National Avenue
Milwaukee, Wisconsin
Offices and Agents in All Principal Cities

P & H Cranes

9933

CARS—Platform, Industrial Railway, Transfer, Narrow Gage
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland, O.
Penn Foundry & Mfg. Co., Reading, Pa.
Whiting Corp., The, Harvey, Ill.

CARS—Sandblast
Pangborn Corp., Hagerstown, Md.

CARS & Locomotives—Industrial
The Industrial Equipment Co., Minster, O.

CASE HARDENING—Compound
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.

CASTINGS—Gray Iron
Bethlehem Steel Co., Bethlehem, Pa.
Chain Belt Co., 273 Park St., Milwaukee, Wis.

CASTINGS—Heat Resistant
Driver-Harris Co., Harrison, N. J.

CASTINGS—Nickel Chromium
Driver-Harris Co., Harrison, N. J.

CEMENT—Fire Brick
Alpha-Lux Co., Inc., 192 Front St., New York.

CEMENT—Furnace
Corundite Refractories, Inc., 920 Duquesne Way, Pittsburgh, Pa.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

CEMENT—High Temperature, Refractory
Alpha-Lux Co., Inc., 192 Front St., New York.

CEMENT—Iron, Steel, Brass
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

CEMENT—Metallic
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

CHAIN BELTING
Chain Belt Co., 273 Park St., Milwaukee, Wis.

CHAIN FOR DRIVES, Conveyors & Elevators
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAPLETS
Cheney, S., & Son, Manlius, N. Y.
Paul & Beekman Manufacturing Co., 1722 N. Fifth St., Philadelphia, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Reeder Manufacturing Co., 6229 Delmar Blvd., St. Louis, Mo.
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.
Standard Chaplet & Supply Co., Swetland Bldg., Cleveland, O.

CHARGING EQUIPMENT—Air Furnace
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Euclid Crane & Hoist Co., The, Euclid, Ohio.

CHEMICALS
Mathieson Alkali Works, Inc., 250 Park Ave., New York City.

CHIPPERS—Pneumatic—See Hammers—Chipping and Riveting, Pneumatic

CINDER MILLS
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland O
Whiting Corp., The, Harvey, Ill.

CLAMPS—Core Box
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

CLAMPS—Flask
Diamond Clamp & Flask Co., Richmond, Ind.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

CLAMPS—Hose—See Hose Clamps

CLAMPS—Patternmakers
Diamond Clamp & Flask Co., Richmond, Ind.

CLAY—Fire—See Fire Clay

CLEANING MACHINERY—Metal
Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.

CLUTCHES—Friction
Jones, W. A., Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.

CLUTCHES—Magnetic
Magnetic Mfg. Co., 278 23rd Ave., Milwaukee, Wis.

COAL
Hanna, The M. A., Co., Leader Bldg, Cleveland, O.
Hillman Coal & Coke Co., First Nat'l Bank Bldg., Pittsburgh.

COAL CRUSHERS and Pulverizers
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Whiting Corp., The, Harvey, Ill.

COAL—ORE—ASH Handling Machinery
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Louden Machinery Co., Fairfield, Iowa.

COKE
Bethlehem Steel Co., Bethlehem, Pa.
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.
Hillman Coal & Coke Co., First Nat'l Bank Bldg., Pittsburgh.
Indiana Consumers Gas & By-Products Co., Terre Haute, Ind.
Semet-Solvay Co., 61 Broadway, New York City.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

COMPRESSORS—Air—See Air Compressors

CONSTRUCTION—Foundry Building—See Buildings—Foundry, Factory, Industrial

CONTRACTORS—See Engineers and Contractors

CONVERTERS—Steel
Whiting Corp., The, Harvey, Ill.

CONVEYING AND Elevating Equipment
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Eastern Corporation, Graybar Bldg., New York City.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago. Ill.
Louden Machinery Co., Fairfield. Iowa.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

CONVEYORS—Belt
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS—Gravity
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.

CONVEYORS—Monorail
Louden Machinery Co., Fairfield, Iowa.

COPPER—Boronic
American Boron Products Co., Inc., Ramsdell and Elmwood Ave., Buffalo, N. Y.

CORE BINDERS
Corn Products Refining Co., 17 Battery Place, New York City.
Dayton Oil Co., Dayton, O.
Kellogg, Spencer, & Sons, Sales Corp., Buffalo, N. Y.
Knefler-Bates Co., Indianapolis, Ind.
Pennsylvania Lubricating Co., 34th & Smallman Sts., Pittsburgh.
Smith, Werner G., Co., 2191 W. 110th St., Cleveland.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

CORE BOXES—Wood
Diamond Clamp & Flask Co., Richmond, Ind.

CORE BREAKERS
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.

CORE COMPOUND
Corn Products Refining Co., 17 Battery Place, New York City.
Kellogg, Spencer, & Sons, Sales Corp., Buffalo, N. Y.
Lindsay-McMillan & Co., 830 S. Water, Milwaukee, Wis.
Pennsylvania Lubricating Co., 34th & Smallman Sts., Pittsburgh.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Smith, Werner G., Co., 2191 W. 110th St., Cleveland, O.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

CORE FLOUR
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

CORE MAKING Machines
American Foundry Equipment Co. 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Demmler, Wm., & Brothers, Kewanee, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh.
International Molding Machine Co., 2616 W. 16th St., Chicago, Ill.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE OIL
Dayton Oil Co., Dayton, O.
Kellogg, Spencer, & Sons, Sales Corp., Buffalo, N. Y.
Lindsay-McMillan & Co., 830 S. Water St., Milwaukee, Wis.
Pennsylvania Lubricating Co., 34th & Smallman Sts., Pittsburgh.
Smith, Werner G., Co., 2191 W. 110th St., Cleveland, O.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich

CORE OVENS
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland, O.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.
Wadsworth Core Machine & Equipment Co., Akron, O.
Whiting Corp., The, Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

CORE PLATES—Steel
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE RACKS
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland.
Truscon Steel Co. (Pressed Steel Div.), Youngstown, O.
Whiting Corp., The, Harvey, Ill.

CORE REDUCERS
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

CORE RODS
Franklin Core Rod & Gagger Co., Franklin, Pa.

CORE ROD STAIGHTENing and Cutting Machines
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.

CORE ROOM EQUIPMENT
Truscon Steel Co. (Pressed Steel Div.), Youngstown, O.
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE SAND MIXERS
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE TAPERING and Cutting Off Machines
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE TESTING MACHINES
Wadsworth Core Machine & Equipment Co., Akron, O.

CORE WASH
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
United States Graphite Co., Saginaw, Mich.

CORE WASHERS AND WATER SAND BLAST COMBINED
Whiting Corp., The, Harvey, Ill.

CRANES
Conkey, H. D., Co., Mendota, Ill.
Euclid Crane & Hoist Co., The, Euclid, Ohio.

CRANES—Bucket
Cleveland Crane & Engineering Co., Wickliffe, O.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Whiting Corp., The, Harvey, Ill.

CRANES—Crawler and Locomotive Type
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRANES—Electric Traveling
Box Crane & Hoist Corp., 2226 Ontario St., Philadelphia, Pa.
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.
Cleveland Crane & Engineering Co., Wickliffe, O.
Euclid Crane & Hoist Co., The, Euclid, Ohio.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

Mexican Plumbago

You are assured of clean smooth castings, no matter how hot you pour your iron, when you use our Mexican Plumbago. Produced in our own mines in Sonora, Mexico, and prepared for use under our direct control, it enables you to cut to a minimum the profit-consuming operations of chipping, sandblasting and grinding.

We'll gladly send you a test lot on request.

The United States Graphite Company
Saginaw, Michigan

New York Philadelphia Pittsburgh Chicago St. Louis San Francisco

•2

PENOLYN CORE OIL

The giant of core binders. Unusual in strength. Consistently uniform, and, "True to the Core".

Pennsylvania Lubricating Co., Pittsburgh, Pa.

AMERICAN BRAND VENT WAX

FOR DEPENDABLE VENTING YOU CAN RELY ON AMERICAN BRAND VENT WAX

If your Supply House can not Supply You—Order Direct.

AMERICAN VENT WAX CO.
64 Market St. Lockport, N. Y.

GOOSE LAKE
Fire Clay and Fire Clay Flour

Illinois Clay Products Company
JOLIET ILLINOIS

Quality Unrivalled is Packaged in plaid!

Hack saw blades—band saws—screw drivers—glass cutters—good mechanics the country over are sure of uniform high quality when they ask for

"The Tools in the Plaid Box."

AMERICAN SAW & MFG. COMPANY
Springfield, Mass.

LENOX

DAYTON CORE OILS
Are
ALWAYS THE SAME
ALWAYS GOOD

They Are Straight Linseed Base Oils.

You May Buy As Good
But
You Cannot Buy Any Better Core Oils.

THE DAYTON OIL COMPANY
1201 E. Monument Ave. Dayton, Ohio

CRANES—Electric Traveling—cont.

Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Scully-Jones & Co., 2012 W. 13th St., Chicago, Ill.
Whiting Corp., The, Harvey, Ill.

CRANES—Gantry

Cleveland Crane & Engineering Co., Wickliffe, O.

CRANES—Hand Traveling

Box Crane & Hoist Corp., 2226 Ontario St., Philadelphia, Pa.
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Louden Machinery Co., Fairfield, Iowa.
Milwaukee Electric Crane & Hoist Corp., Milwaukee, Wis.
Scully-Jones & Co., 2012 W. 13th St., Chicago, Ill.
Whiting Corp., The, Harvey, Ill.

CRANES—Jib

Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Scully-Jones & Co., 2012 W. 13th St., Chicago, Ill.
Whiting Corp., The, Harvey, Ill.

CRANES—Monorail

Euclid Crane & Hoist Co., The, Euclid, Ohio.

CRANES—Overhead

Euclid Crane & Hoist Co., The, Euclid, Ohio.
Louden Machinery Co., Fairfield, Iowa.

CRANES—Wall

Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Whiting Corp., The, Harvey, Ill.

CRUCIBLE LIFTERS

Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.

CRUCIBLES

Dixon, Jos., Crucible Co., Jersey City, N. J.
Lava Crucible Co., of Pittsburgh, 309 Wabash Bldg., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.

CRUSHED STEEL—See Steel—Crushed

CUPOLA BLOCKS

U. S. Refractories Corp., Mt. Union, Pa.

CUPOLA BLOWERS

General Electric Co., Schenectady, N. Y.
Spencer Turbine Co., Hartford, Conn.

CUPOLA BRICK

Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
Whiting Corp., The, Harvey, Ill.

CUPOLA CHARGING Machines—Electric

Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Whiting Corp., The, Harvey, Ill.

CUPOLA DAUB

Alpha-Lux Co., Inc., 192 Front St., New York.
Illinois Clay Products Co., Joliet, Ill.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

CUPOLA LIGHTERS

Hauck Mfg. Co., 126 Tenth St., Brooklyn, N. Y.

CUPOLA LININGS

Alpha-Lux Co., Inc., 192 Front St., New York.

CUPOLAS

Sly, W. W., Mfg. Co., The, 4702 Train Ave., Cleveland, O.
Whiting Corp., The, Harvey, Ill.

CUTTING AND WELDING —Oxy-Acetylene—See Welding and Cutting Apparatus and Supplies—Oxy-Acetylene

CYLINDERS—Acetylene—See Acetylene in Cylinders

CYLINDERS—Oxygen—See Oxygen in Cylinders

DECARBONIZING Apparatus

Oxweld Acetylene Co., Newark, N. J.

DEOXIDIZERS

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

DESULPHURIZER

Mathieson Alkali Works, Inc., 250 Park Ave., New York City.

DIE CASTING EQUIP. —Goose Necks and Pots

Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

DOWEL PINS—Brass

Diamond Clamp & Flask Co., Richmond, Ind.

DOWEL PINS—Brass, Iron, Wood

Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

DRILLS—Electric

Cincinnati Electrical Tool Co., 2678 Madison Rd., Cincinnati, O.

DRILLS—Pneumatic

Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.
Chicago Pneumatic Tool Co., 11 Broadway, New York City.

DRYERS—Sand—See Sand Dryers

DRYING MACHINES & APPARATUS

Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.

DUST ARRESTING and Collecting Systems

American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Knickerbocker Co., The, Jackson, Mich.
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Whiting Corp., The, Harvey, Ill.

ELECTRICAL EQUIPMENT

General Electric Co., Schenectady, N. Y.

ELEVATORS and Conveyors

Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Whiting Corp., The, Harvey, Ill.

EMERY GRINDERS

Safety Grinding Wheel & Machine Co., Springfield, O.

ENGINEERS—Architects, Contractors

Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Carman, Edwin S., Inc., 607 Carnegie Hall, 1220 Huron Rd., Cleveland, O.

ENGINEERS—Foundry Mechanical, Electrical, etc.

Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Hunt, Robert W., Co., 175 W. Jackson Blvd., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.

EXHAUST SYSTEMS

American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
General Electric Co., Schenectady, N. Y.
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Whiting Corp., The, Harvey, Ill.

EYE PROTECTORS—See Goggles and Eye Protectors

FACING SAND MIXERS

National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

FACINGS

Dixon, Jos., Crucible Co., Jersey City, N. J.
Knefler-Bates Co., Indianapolis, Ind.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
United States Graphite Co., Saginaw, Mich.

FANS

General Electric Co., Schenectady, N. Y.

FERROALLOYS

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Williams & Co., Inc., 901-37 Pennsylvania Ave., Pittsburgh, Pa.

FERROCARBON-Titanium

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

FERROCHROME

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FERROMANGANESE

Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Foundry Manganese Co., 208 Harrison Bldg., Philadelphia, Pa.

FERROSILICON

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Foundry Manganese Co., 208 Harrison Bldg., Philadelphia, Pa.

FILLET—Leather, Wood

Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

FIRE BRICK AND CLAY

Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

FIRE CLAY

Illinois Clay Products Co., Barber Bldg., Joliet, Ill.

FIRE SAND

Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.

FLASK FITTINGS

Adams Co., 175 Foster St., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Michigan Screw Co., Lansing, Mich.

FLASKS—Steel

American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.
Sterling Wheelbarrow Co., Milwaukee, Wis.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.
Truscon Steel Co. (Pressed Steel Div.), Youngstown, O.

FLASKS, SNAP AND SLIP —Cherry Wood

Adams Co., The, 175 Foster St., Dubuque, Iowa.

FLOUR—Foundry

Illinois Clay Products Co., Joliet, Ill.
Knefler-Bates Co., Indianapolis, Ind.

FLUX—Aluminum

Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

FLUX—Aluminum, Brass, Copper, Iron, Steel

Mathieson Alkali Works, Inc., 250 Park Ave., New York City.
Oxweld Acetylene Co., Newark, N. J.

FLUX—Welding

Oxweld Acetylene Co., Newark, N. J.

FORGINGS Pressed & Drop

Bethlehem Steel Co., Bethlehem, Pa.

FORKS

American Fork & Hoe Co., 1924 Keith Bldg., Cleveland, O.

FOUNDRY AND FACTORY Buildings—See Buildings—Foundry, Factory, Industrial

FOUNDRY ENGINEERS—See Engineers—Foundry, Mechanical, Electrical, etc.

FOUNDRY EQUIPMENT—Second Hand

Clifton-Pratt Co., The, Cincinnati, O.
Scully-Jones & Co., 2012 W. 13th St., Chicago, Ill.

FOUNDRY SPECIALISTS —Consulting

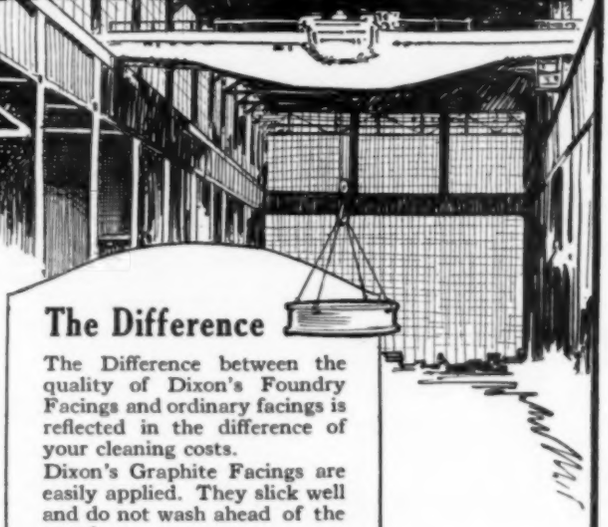
Vickers, Charles, 110 Main St., Buffalo, N. Y.

FOUNDRY SUPPLY Houses

McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

DIXON'S GRAPHITE FACINGS



The Difference

The Difference between the quality of Dixon's Foundry Facings and ordinary facings is reflected in the difference of your cleaning costs.

Dixon's Graphite Facings are easily applied. They slick well and do not wash ahead of the metal.

Made in Jersey City, N. J., by the
Joseph Dixon Crucible Company
Dept. 51-S
Established 1827

Tell us your conditions, and we'll gladly send samples.

*1 F

TRUSCON Foundry Flasks

withstand hard usage and give long service. Furnished in standard sizes and in special types designed to fit the job. Write for catalog and quotations.

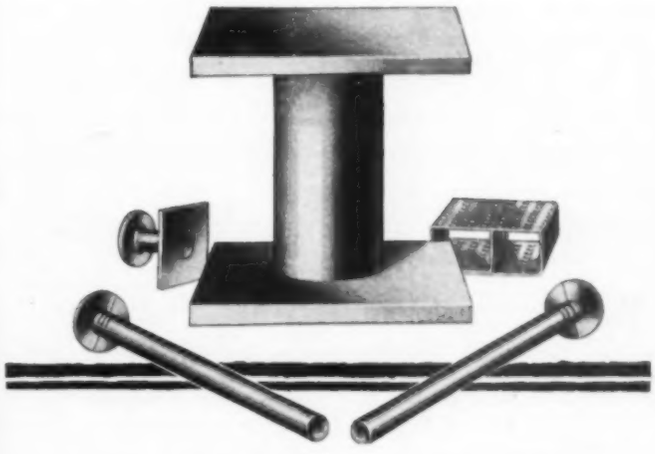
STEEL BOXES AND SKID PLATFORMS speed up production by saving time in handling materials and products.

TRUSCON STEEL COMPANY
PRESSED STEEL DIVISION
CLEVELAND, OHIO

A chaplet may be substantially made and well coated (tinned), and still be inefficient if it does not have the proper fusing qualities. Use Shanafelt Special Basic Metal Chaplets.

Uniform in quality and always the same.

THE SHANAFELT MANUFACTURING CO.
Established 1893
Canton, Ohio, U. S. A.



SHANAFELT
SPECIAL BASIC METAL
CHAPLETS

X-CEL-ALL STEEL CEMENT

Made expressly for filling sand and blow holes. Saves many castings which would otherwise be unfit for commercial use.

FURNACE LININGS—Clay
Illinois Clay Products Co., Joliet, Ill.

FURNACES—Crucible
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

FURNACES—Crucible Steel
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.

FURNACES—Electric-Brass and Aluminum
Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.
Detroit Electric Furnace Co., 825 W. Elizabeth St., Detroit, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Electric Furnace Corp., 32nd St. & Putney Way, Pittsburgh, Pa.

FURNACES—Electric Melting
American Bridge Co., 71 Broadway, New York City.
Detroit Electric Furnace Co., 825 W. Elizabeth St., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Pittsburgh Electric Furnace Corp., 32nd St. & Putney Way, Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
Swindell, Wm., & Bros., P. O. Box 1753, Pittsburgh, Pa

FURNACES—Melting—Aluminum and Brass
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
Fisher, Alfred, Furnaces, Inc., 762 West Adams St., Chicago, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Pittsburgh Electric Furnace Corp., 32nd St. & Putney Way, Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
Whiting Corp., The, Harvey, Ill.

FURNACES—Open Hearth
Swindell, Wm., & Bros., P. O. Box 1753, Pittsburgh, Pa.

GAGGER MOLDS
Wadsworth Core Machine & Equipment Co., Akron, O.

GAGGERS
Bourne-Fuller Co., 1912 Scranton Rd., Cleveland, O.
Franklin Core Rod & Gagger Co., Franklin, Pa.
Shanafelt Manufacturing Co., The, 1228 Fourth St., S. W., Canton, O.
United Compound Co., 228 Elk St., Buffalo, N. Y.

GAS—Oxygen, Nitrogen
Prest-O-Lite Co., Inc., 30 E. 42nd St., New York City.

GAS BOOSTERS—Rotary Positive Pressure
General Electric Co., Schenectady, N. Y.

GAS EXHAUSTERS—Rotary Positive Pressure
General Electric Co., Schenectady, N. Y.

GAUGES—Welding
Oxweld Acetylene Co., Newark, N. J.
Jones, W. A., Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.

GEARS—Machine Molded
Jones, W. A., Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.

GLOVES—Asbestos
Oxweld Acetylene Co., Newark, N. J.

GLOVES—Sandblast
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

GOGGLES AND EYE Protectors
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Oxweld Acetylene Co., Newark, N. J.

GRAPHITE
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
United States Graphite Co., The, Saginaw, Mich.

GRAPHITE—Boiler and Lubricating
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
United States Graphite Co., Saginaw, Mich.

GRINDERS—Electric Portable
Cincinnati Electrical Tool Co., 2678 Madison Rd., Cincinnati, O.
Marschke Mfg. Co., div. of Black & Decker Co., Towson, Md.

GRINDERS—Pneumatic Portable
Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.
Cincinnati Electrical Tool Co., 2678 Madison Rd., Cincinnati, O.
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Rotor Air Tool Co., 5900 Carnegie Ave., Cleveland, O.

GRINDING MACHINES—Snagging, Motor Driven
Cincinnati Electrical Tool Co., 2678 Madison Rd., Cincinnati, O.
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Kling Bros. Engineering Wks., 1300 N. Kostner Ave., Chicago.
Marschke Mfg. Co., Div. of Black & Decker Co., Towson, Md.
Safety Grinding Wheel & Machine Co., Springfield, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

GRINDING PANS—Sand
Phillips & McLaren Co., 24th and Smallman Sts., Pittsburgh, Pa.

GRINDING WHEEL Stands
Marschke Mfg. Co., Div. of Black & Decker Co., Towson, Md.

GRINDING WHEELS—See Abrasive Wheels

GRINDSTONES—Power and Hand
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

GRIT—Angular and Steel
American Steel Abrasives Co., Galion, O.
Globe Steel Abrasive Co., Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Steelblast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

HACK SAWS—See Saws—Hack

HAMMERS—Chipping and Riveting—Pneumatic
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.

HANGERS—Roller Bearing for Line Shafts
Hyatt Roller Bearing Co., Harrison, N. J.

HARDNESS TESTING & Heat Measuring Instruments
Shore Instrument & Mfg. Co., Inc., Van Wyck Ave. & Carll St., Jamaica, L. I., New York.

HEATERS—Industrial Oven
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Maehler, Paul, Co., The, 2210 West Lake St., Chicago, Ill.

HELMETS—Sandblast
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pulmosan Safety Equipment Corp., 172 Johnson St., Brooklyn, N. Y.

HINGE TUBES
Shanafelt Manufacturing Co., The, 1228 Fourth St., S. W., Canton, O.

HOISTING MACHINERY
Cleveland Crane & Engineering Co., Wickliffe, O.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.

HOISTS—Air
Hanna Engineering Works, 1761 Elston Ave., Chicago, Ill.

HOISTS—Chain
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Lakeside and E. 49th St., Cleveland, O.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Louden Machinery Co., Fairfield, Iowa.

HOISTS—Electric
Box Crane & Hoist Corp., 2226 Ontario St., Philadelphia, Pa.
Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.

HOISTS—Monorail
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Louden Machinery Co., Fairfield, Iowa.

HOISTS—Pneumatic
Whiting Corp., The, Harvey, Ill.

HOODS—Leather Sandblast
Pangborn Corp., Hagerstown, Md.

HOSE—Sandblast
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

HOSE—Welding
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Oxweld Acetylene Co., Newark, N. J.

HOSE COUPLINGS—Pneumatic
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.

IDLES—Conveyors and Elevators
Chain Belt Co., 273 Park St., Milwaukee, Wis.

INGOTS—Aluminum
British Aluminium Co., 122 E. 42nd St., New York City.

INGOTS—Brass, Bronze, Copper, Nickel
Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.

IRON ORE
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.

JACKETS—Snap Flask Mold
Adams Co., 175 Foster St., Dubuque, Iowa.
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Shanafelt Manufacturing Co., The, 1228 Fourth St., S. W., Canton, O.

JOLT RAMMING Machines
International Molding Machine Co., 2616 W. 16th St., Chicago, Ill.

JOLT RAMMING Machines—Pneumatic and Electric
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

LABORATORIES — Physical Testing
Hunt, Robert W., Co., 175 W. Jackson Blvd., Chicago, Ill.

LADLE HEATERS AND Dryers
Hauck Mfg. Co., 126 Tenth St., Brooklyn, N. Y.

LADLE LININGS
Alpha-Lux Co., Inc., 192 Front St., New York.
Illinois Clay Products Co., Joliet, Ill.

LADLES
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
Industrial Equipment Co., Minster, O.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
Whiting Corp., The, Harvey, Ill.

LADLES—Truck
Whiting Corp., The, Harvey, Ill.

LEAD
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
United States Graphite Co., The, Saginaw, Mich.

LINE SHAFT BEARINGS—Roller
Hyatt Roller Bearing Co Harrison, N. J.

LININGS—Monolithic
Alpha-Lux Co., Inc., 192 Front St., New York.

LINSEED OIL
Pennsylvania Lubricating Co., 34th & Smallman Sts., Pittsburgh.

LINSEED—OIL—Core
Kellogg, Spencer, & Sons, Sales Corp., Buffalo, N. Y.
Smith, Werner G., Co., 2191 W. 110th St., Cleveland, O.

LOADERS—Batch
Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.

LOADERS—Portable, Belt or Bucket
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

A Chicago Foundry Has Used 7166 lbs. of MENCO Pattern Compound

MENCO is used by adding it to water to form a smooth, thin cream, and then poured into the mold.

Since June 26, 1921 and has this to say:

"We are sold on Menco for our foundry and have recommended it to others as a desirable material for making matches."

YOU can not afford to be without MENCO.

During this month we will accept your order for 100 pounds of MENCO at 12 cents per lb. FOB Fort Wayne, Ind.

The Menefee Foundry Company, Inc.
Sole Manufacturers
Fort Wayne, Indiana

HAMMOND
OF KALAMAZOO
GRINDERS AND POLISHERS
Electrically Driven - Belt Driven
In a Complete Range of Sizes and Types
Hammond Machinery Builders
KALAMAZOO, MICHIGAN
FORMERLY HILL-CURTIS COMPANY

Portable Air Tools
HERCULES
Drills - Grinders
Buffers - Sanders
Nutsetters
THE BUCKEYE PORTABLE TOOL CO. DAYTON OHIO

U. S. ALUMINUM MATCH PLATE CO.
1269 West 76th St. Cleveland, Ohio
Specializing in
CAST ALUMINUM MATCH PLATES
BRASS AND ALUMINUM PATTERN CASTINGS
Exclusively

CHAPLETS
Better Made and Pure Tin Coated
Special Chaplets Made to Order
STANDARD CHAPLET & SUPPLY CO.,
SWETLAND BUILDING, CLEVELAND, OHIO

Wood and Metal Patterns
Matchplate Work a Specialty
Send Blueprints for Estimates
Bascom & Co., Troy, N. Y.
Established 94 Years

BUFFALO BRAND "That Dependable Vent Wax"
Makes free rapid passage of gases absolutely sure, greatly reduces casting mortality rate—and saves money.
UNITED COMPOUND CO. 228 Elk Street, Buffalo, N. Y., U. S. A.
*2A

LUBRICANTS—Industrial
Lindsay-McMillan & Co., 930 S. Water St., Milwaukee, Wis.

MACHINERY—Special
Bethlehem Steel Co., Bethlehem, Pa.
Whiting Corp., The, Harvey, Ill.

MAGNETIC CLUTCHES—See Clutches—Magnetic

MAGNETICS—Electro, Safety
Magnetic Mfg. Co., 278-23rd Ave., Milwaukee, Wis.

MANDRELS—Expanding
Western Tool & Mfg. Co., The, Springfield, O.

MANIFOLDS—Oxygen
Oxweld Acetylene Co., Newark, N. J.

MATCH—PLATES—Aluminum
U. S. Aluminum Match Plate Co., 1269 W. 76th St., Cleveland, O.

MELTING POTS
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

METALLURGISTS
Hunt, Robert W., Co., 175 W. Jackson Blvd., Chicago, Ill.
Putnam, A. H., City Hall Bldg., Rock Island, Ill.

METALS—Nonferrous
Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

MILLING STARS AND Jacks—See Stars—Tumbling Mill

MILLS—Sand Mixing and Compounding
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Wadsworth Core Machine & Equipment Co., Akron, O.

MIXERS—Sand—See Sand Mixers and Cutters

MOLD CONVEYORS
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill.

MOLD DRYERS
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

MOLD OVENS
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

MOLDERS—Shovels
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

MOLDING MACHINES
Adams Co., The, 175 Foster St., Dubuque, Iowa.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Demmler, Wm., & Brothers, Kewanee, Ill.
Hanna Engineering Works, 1761 Elston Ave., Chicago, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2616 W. 16th Ct., Chicago, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Moline Iron Wks., Moline, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

MOLDING MACHINES—Roll Over
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh.
International Molding Machine Co., 2616 W. 16th St., Chicago, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Manufacturing Co., 6225 Tacony St., Philadelphia, Pa.

MOLDING MACHINES—Squeezer
Adams Co., The, 175 Foster St., Dubuque, Iowa.
Arcade Mfg. Co., Dept. D Freeport, Ill.
Hanna Engineering Works, 1761 Elston Ave., Chicago, Ill.
International Molding Machine Co., 2616 W. 16th St., Chicago, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Moline Iron Wks., Moline, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

MOLDING SAND BOND
Illinois Clay Products Co., Joliet, Ill.

MOLDS—Ingot
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

MOLDING SYSTEMS—Continuous
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, O.

MONEL METAL
Driver-Harris Co., Harrison, N. J.

MONOGRAMS—Foundry Marks
Shanafelt Manufacturing Co., 1228 Fourth St., S. W., Canton, O.

MONORAIL SWITCHES—and Turntables
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric
General Electric Co., Schenectady, N. Y.

NICKEL
Williams & Co., Inc., 991-37 Penn. Ave., Pittsburgh, Pa.

NICKEL—Alloys
Niagara Falls Smelting & Refining Corp., 2204 Elmwood St., Buffalo, N. Y.

NITROGEN—Gas
Linde Air Products Co., 30 E. 42nd St., New York City.

NOZZLES—Sandblast
Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

NUT DRIVING TOOLS—Portable Pneumatic
Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.

OIL—Core—See Core Oil

OIL BURNING SYSTEMS
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Foundry Equipment Co., The, 1831 Columbus Rd., Cleveland, O.
Hauck Mfg. Co., 126 Tenth St., Brooklyn, N. Y.

OIL STONES
Cleveland Stone Co., 1125 Builders Exchange Bldg., Cleveland, O.
Sterling Grinding Wheel Co., Tiffin, Ohio.

OVENS—Annealing
Whiting Corp., The, Harvey, Ill.

OVENS—Core—See Core Ovens

OVENS—Core Baking
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Maehler, Paul, Co., The, 2210 West Lake St., Chicago, Ill.

OVENS—Enameling, Japanning, etc.
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.
Maehler, Paul, Co., The, 2210 West Lake St., Chicago, Ill.
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

OVENS—Mold—See Mold Ovens

OVENS—Oil or Electric
Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill
Maehler, Paul, Co., The, 2210 West Lake St., Chicago, Ill.

OXY-ACETYLENE EQUIPment—See Welding and Cutting Apparatus and Supplies—Oxy-acetylene

OXY-ACETYLENE WELDing and Cutting—See Welding and Cutting Apparatus and Supplies—Oxy-Acetylene

OXYGEN IN CYLINDERS
Linde Air Products Co., 30 E. 42nd St., New York City.

PAINT—GRAPHITE
United States Graphite Co., The, Saginaw, Mich.

PANS—Grinding—See Grinding Pans—Sand

PANS—Tempering
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Phillips & McLaren Co., 24th and Smallman Sts., Pittsburgh, Pa.

PARTING COMPOUNDS
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

PATTERN COMPOUND
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Menefee Foundry Co., Ft. Wayne, Ind.

PATTERN LETTERS
Shanafelt Mfg. Co., 1228 Fourth St., S. W., Canton, O.

PATTERN PLATES—Aluminum
U. S. Aluminum Match Plate Co., 1269 W. 76th St., Cleveland, O.

PATTERN WAX
United Compound Co., 228 Elk St., Buffalo, N. Y.

PATTERNS—Wood, Metal
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Bascom & Co., River & Hoosick Sts., Troy, N. Y.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh.

PERMANENT MOLDING Machines—See Molding Machines—Permanent Mold

PICKLING MACHINES
Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.

PIG IRON
Bethlehem Steel Co., Bethlehem, Pa.
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.
Pilling & Co., Inc., 1500 Chestnut St., Philadelphia, Pa.

PILING MACHINES—See Tiering Machines

PINCH DOGS
Diamond Clamp & Flask Co., Richmond, Ind.

PINS—Flask
Michigan Screw Co., Lansing, Mich.

PLATES—Core Drying
Wadsworth Core Machine & Equipment Co., Akron, O.

PLATES—Rapping
Diamond Clamp & Flask Co., Richmond, Ind.

PLATES—Snap Flask Bottom
Adams Co., 175 Foster St., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Wadsworth Core Machine & Equipment Co., Akron, O.

PLUMBAGO
Dixon, Jos., Crucible Co., Jersey City, N. J.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.
United States Graphite Co., Saginaw, Mich.

PLUMBING FIXTURES
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.

PNEUMATIC TOOLS—See Tools—Pneumatic

POLISHERS' AND Platers' Supplies
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

POURING DEVICES
Arcade Mfg. Co., Dept. D, Freeport, Ill.

POWDERED COAL PLANT
Whiting Corp., The, Harvey, Ill.

POWER SQUEEZERS—See Squeezers—Hand and Power

POWER TRANSMISSION Machinery
Jones, W. A., Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.

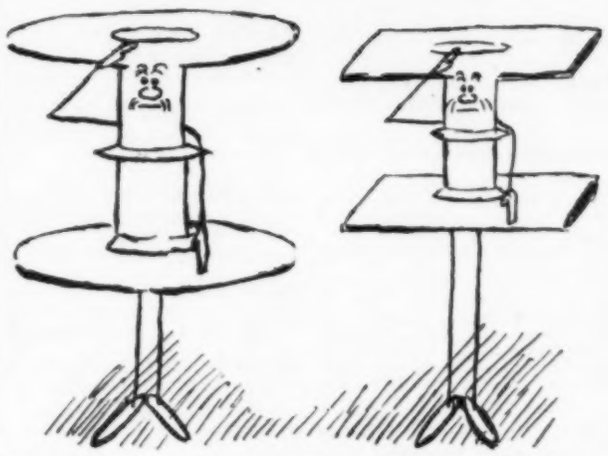
PREHEATING APPARAtus
Oxweld Acetylene Co., Newark, N. J.

PULLEYS—Magnetic
Magnetic Mfg. Co., 278 23rd Ave., Milwaukee, Wis.

PYROMETERS
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

THEY'RE READY
TO GIVE THEIR LIVES



THESE ARE JUST TWO OF THE LARGE LINDSAY CHAPLET FAMILY. THEY'RE MADE OF THE RIGHT STUFF, AND WILL HELP YOU WITH YOUR CASTING JOBS,— EVEN TO GIVING THEIR LIVES.

Paul & Beekman Mfg. Co., 1724 N. 5th St., Phila., Pa.

Write for Copy
of No. 8
MARSCHKE CATALOG-

containing data on the complete line of Marschke Grinders and Buffers.

Simply fill in Coupon and mail.

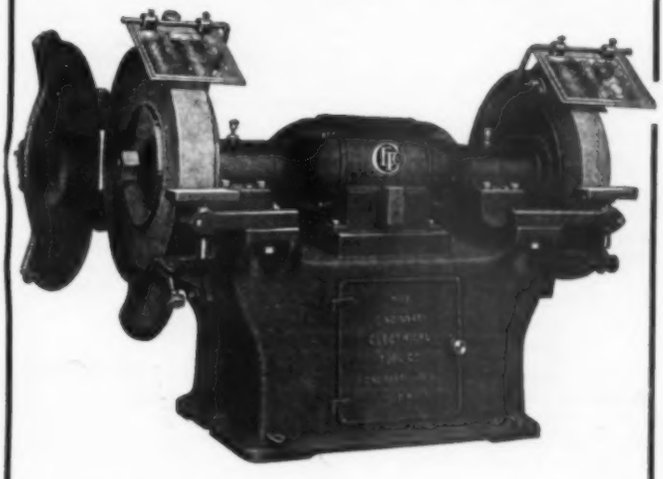
MARSCHKE MANUFACTURING CO.
TOWSON, MARYLAND, U. S. A.

Please send me at address given below, a FREE copy of your new 1929 Catalog.

NAME_____

ADDRESS_____

Do your Heavy Snagging with *The Cincinnati* TRADE MARK Floor Grinder



It Stands the Gaff of Most Severe Service

THE CINCINNATI Floor Grinder is a machine you can "rush" day in and day out with complete confidence in its ability to give long service. Maintenance cost is negligible.

A few outstanding features:—Timken Roller Bearings, General Electric Motors, Safety Starte s with Push Button Control, Adjustable Wheel Guards, Non-Breakable Eye Shields and Chip Breakers.

Furnished at proper speeds for Vitrified or Silicate bond wheels as well as High Speed Wheels. (9000 Surface Feet per minute.)

The Cincinnati Electrical Tool Co.
2678 Madison Rd., Cincinnati, Ohio

Ball-Bearing Electric Drills—Screw Drivers—Nut Setters — Tappers — Valve Grinders — Bench and Floor Grinders and Buffers — Hand and Aerial Grinders—Tool Post Grinders, etc.

PYROSCOPES
Shore Instrument & Mfg. Co., Inc., Van Wyck Ave. and Carll St., Jamaica, L. I., New York.

RAILWAY EQUIPMENT—Cars, Industrial, etc.
Bethlehem Steel Co., Bethlehem, Pa.
General Electric Co., Schenectady, N. Y.

RAMMERS—Sand Pneumatic—See Sand Rammers—Pneumatic

RAPPING PLATES
Shanafelt Mfg. Co., 1228 Fourth St., S. W., Canton, O.

RECLAIMERS—Sand—See Sand Reclaimers

REGULATORS—Compressed Air
Oxweld Acetylene Co., Newark, N. J.

RESPIRATORS
Pulmosan Safety Equipment Corp., 122 Johnson St., Brooklyn, N. Y.

RIBS—Chill
Reeder Manufacturing Co., 6229 Delmar Blvd., St. Louis, Mo. St. Louis, Mo.

RIDDLES
Lowe Manufacturing Co., 6063 Wabash Ave., Detroit, Mich.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.

RIDDLES—Pneumatic
Adams Co., The, 175 Foster St., Dubuque, Iowa.

RIVETERS—See Hammers—Chipping and Riveting—Pneumatic

RODS—Iron & Steel
Bethlehem Steel Co., Bethlehem, Pa.

RODS—Welding—See Welding Rods and Wire

ROLLER BEARINGS
Hyatt Roller Bearing Co., Harrison, N. J.

ROSIN—Wood
Hercules Powder Co., Wilmington, Del.

ROUTERS—Portable Electric
Cincinnati Electrical Tool Co., 2678 Madison Rd., Cincinnati, O.

ROUTING TOOLS—Portable Pneumatic
Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.

SAFETY APPLIANCES
Pangborn Corp., Hagerstown, Md.

SAND
Cape May Sand Co., Cape May, N. J.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Ottawa Silica Co., Ottawa, Ill.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.

SAND—Core
Cape May Sand Co., Cape May, N. J.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Ottawa Silica Co., Ottawa, Ill.
Whitehead Brothers Co., 537 W. 27th St., New York City.

SAND—Molding
Keener Sand & Clay Co., 514 Hartman Bldg., Columbus, O.
Ottawa Silica Co., Ottawa, Ill.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Whitehead Brothers Co., 537 W. 27th St., New York City.

SAND—Sandblast
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Cape May Sand Co., Cape May, N. J.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Whitehead Brothers Co., 537 W. 27th St., New York City.

SAND—Silica
Ottawa Silica Co., Ottawa, Ill.

SAND—Silica Molding
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.

SAND—Steel Molding
Cape May Sand Co., Cape May, N. J.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Ottawa Silica Co., Ottawa, Ill.
Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Whitehead Brothers Co., 537 W. 27th St., New York City.

SANDBLAST ABRASIVES—Steel Shot and Grit
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Globe Steel Abrasive Co., Dept. F, Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Steelblast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

SANDBLAST EQUIPMENT and Accessories
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Direct Separator Co., Inc., Syracuse, N. Y.
Koven, L. O., & Brother, Inc., 154 Ogden Ave., Jersey City, N. J.
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., The, 4702 Train Ave., Cleveland, O.

SANDBLAST—Hydraulic
Whiting Corp., The, Harvey, Ill.

SANDBLAST NOZZLES—See Nozzles—Sandblast

SANDBLAST SHOT—Steel See Shot—Steel Sandblast

SANDBLAST TUMBLING Barrels—See Tumbling Barrels

SAND CONTROL Machines
Dietert, Harry W., 1275 Casgrain Ave., Detroit, Mich.

SAND CONVEYING AND Handling Equipment
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Louden Machinery Co., Fairfield, Iowa.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

SAND CUTTING Machines
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.

SAND DRYERS
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Pangborn Corp., Hagerstown, Md.

SAND GRINDING PANS—See Grinding Pans—Sand

SAND MIXERS AND Cutters
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Royer Foundry & Machine Co., Kingston Sta., Wilkes-Barre, Pa.

SAND PREPARATION & Distributing Systems
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

SAND RAMMERS—Pneumatic
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.

SAND RECLAIMERS
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.

SAND SIFTERS AND Screening Machines
Adams Co., The, 175 Foster St., Dubuque, Iowa.
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Bartlett, C. O., & Snow Co. 6201 Harvard Ave., Cleveland, O.
Hanna Engineering Works, 1761 Elston Ave., Chicago, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Lowe Manufacturing Co., 6063 Wabash Ave., Detroit, Mich.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Royer Foundry & Machine Co., Kingston Sta., Wilkes-Barre, Pa.

SANDERS—Portable
Bethlehem Steel Co., Bethlehem, Pa.
Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.

SAND STORAGE BINS and Gates
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.
Chain Belt Co., 273 Park St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago.

SAWS—Cold Inserted Tooth
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

SAWS—Cold Metal
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

SAWS—Hack
American Saw & Mfg. Co., Springfield, Mass.

SAWS—Metal Band
American Saw & Mfg. Co., Springfield, Mass.

SCLEROSCOPES
Shore Instrument & Mfg. Co., Inc., Van Wyck Ave., and Carll St., Jamaica, L. I., New York.

SCREENS—Sand
Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.

SCREW DRIVERS—Portable Pneumatic
Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.

SEACOAL
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

SEPARATORS—Air, Moisture, Oil
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Smith-Monroe Co., 223 South Main St., South Bend, Ind.
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.

SEPARATORS—Magnetic & Electro Magnetic of all Kinds
Magnetic Mfg. Co., 278 23rd Ave., Milwaukee, Wis.

SEPARATORS—Sand
Magnetic Mfg. Co., 278 23rd Ave., Milwaukee, Wis.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.
Royer Foundry & Machine Co., Kingston Sta., Wilkes-Barre, Pa.

SHAFTING HANGERS—Roller Bearing
Hyatt Roller Bearing Co., Harrison, N. J.

SHOES—Foundry
Rohrbacher Shoe Co., 60 South St., Boston, Mass.

SHOES—Moulders
Rohrbacher Shoe Co., 60 South St., Boston, Mass.

SHOP FURNITURE
Western Tool & Mfg. Co., The, Springfield, Ohio.

SHOT—Steel, Sandblast
American Steel Abrasive Co., Galion, O.
Globe Steel Abrasive Co., Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Steelblast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

Cape May Sand

CAPE MAY SAND CO
CAPE MAY CITY, N.J.

Many foundries have used Cape May Sand for years. They have found better results are possible with sand of a uniform quality, that is sharp and flinty, doesn't pulverize and is free from organic matter.

Undried or kiln dry grades of sandblast sands are available in five sizes, Nos. 0, 1, 2, 3 and 4. Double screening insures uniform size.

Shipments are prompt. We have railroad connections with Pennsylvania R. R. and Philadelphia and Reading R. R.

Order direct or through our dealers.

Cape May Sand Company
512 Washington Street
Cape May, N. J.

Always Good

The LOWE
Electric Sifting Machine

Model 7 is equipped with removable or renewable 21" screen

Will sift a ton of sand in four minutes. Operates at a cost of about one cent per hour.

The gyratory motion is perfectly balanced keeping the sieve in a state of constant equilibrium—an exclusive LOWE feature. The frame supporting the sieve is separate from the one on which the motor is mounted. This has eliminated all swaying or rotary motion of the machine itself.

Sold by all foundry supply houses.

30 days free trial in your own plant.

Write for full particulars.

LOWE MANUFACTURING CO.
6063 Wabash Ave., Detroit, Mich.

Whitehead's Foundry Sands

are laboratory controlled and foundry tested

We are amply equipped and prepared to furnish the proper sand for any variety of casting, having unexcelled resources and facilities. We are producers and shippers of Albany and North River Molding Sand, New Jersey Molding Sand, Lumberton Sand, Millville Gravel, Cattarugus Molding Sand, Windsor Lock Molding Sand, Strong and Sharp Silica Steel Molding Sand, Furnace Bottom Sand, Screened Jersey Fire Sand, Jersey Fire Clay, Kaolin and Cupola Daub, Core Sands and Blast Sands. Importers of French Sand.

We also carry in our various warehouses a complete line of foundry supplies.

WHITEHEAD BROTHERS COMPANY
Providence NEW YORK Buffalo
FOUNDRY SANDS, SUPPLIES AND EQUIPMENT

SHOT AND GRIT—Sandblast

American Steel Abrasives Co., Galion, O.
Globe Steel Abrasive Co., Dept. F, Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Steelblast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

SHOVELS

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

SKIMMERS

Aluminum Foundry Equipment Co., 319 Plymouth Bldg., Cleveland.

SKIP HOISTS

Bartlett, C. O., & Snow Co., 6201 Harvard Ave., Cleveland, O.

SLIP JACKETS—Steel

Adams Co., The, 175 Foster St., Dubuque, Iowa.
American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Diamond Clamp & Flask Co., Richmond, Ind.

SNAP FLASK BOTTOM Plates—See Plates—Bottom Snap Flask

SNAP FLASK TRIMMINGS

Adams Co., The, 175 Foster St., Dubuque, Iowa.

SNAP FLASKS—See Flasks—Steel

SNAP MOLD JACKETS—See Jackets—Snap Flask and Mold

SNAP STEEL TRIMMINGS

Diamond Clamp & Flask Co., Richmond, Ind.

SODA ASH

Mathieson Alkali Works, Inc., 250 Park Ave., New York City

SPEED REDUCERS

Jones, W. A., Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.

SPIEGELEISEN

Bethlehem Steel Co., Bethlehem, Pa.

SPLIT PATTERN MACHINES

Tabor Mfg., Co., The, 6225 Tacony St., Philadelphia.

SPRUE CUTTERS

Adams Co., The, 175 Foster St., Dubuque, Iowa.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland, O.

SQUEEZERS—Hand and Power

Adams Co., The, 175 Foster St., Dubuque, Iowa.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Milwaukee Foundry Equipment Co., 1204 S. Pierce St., Milwaukee.
Moline Iron Wks., Moline, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

STAMPINGS

Hydraulic Pressed Steel Division, (Truscon Steel Co.) 6100 Hydraulic Ave., Cleveland.

STARS—Foundry Twisted

Franklin Core Rod & Gagger Co., Franklin, Pa.

STARS—Tumbling Mill

Ervin Foundry & Mfg. Co., 930 E. Michigan St., Adrian, Mich.
Franklin Core Rod & Gagger Co., Franklin, Pa.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.

STEEL

Bethlehem Steel Co., Bethlehem, Pa.

STEEL—Crushed

American Steel Abrasive Co., Galion, O.
Globe Steel Abrasive Co., Mansfield, O.
Pittsburgh Crushed Steel Co., 61st St. & A.V.R.R. Pittsburgh, Pa.
Steelblast Abrasives Co., Cleveland, O.

STEEL—High Speed

Bethlehem Steel Co., Bethlehem, Pa.

STEEL—Structural

American Bridge Co., 71 Broadway, New York City.
Bethlehem Steel Co., Bethlehem, Pa.

STEEL BANDS

Adams Co., The, 175 Foster St., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Shanafelt Mfg. Co., 1228 4th St., S. W., Canton, O.

STEEL BARGES

American Bridge Co., 71 Broadway, New York City.

STEEL SHOT

American Steel Abrasives Co., Galion, O.
Globe Steel Abrasive Co., The, Mansfield, O.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Steelblast Abrasives Co., Cleveland, O.
Steel Shot & Grit Co., Amesbury, Mass.

STEEL TOWERS

American Bridge Co., 71 Broadway, New York City.

TALC

Pettinos, Geo. F., 1206 Locust St., Philadelphia, Pa.
Stevens, Frederic B., Inc., Larned and Third Sts., Detroit, Mich.

TITANIUM

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

TONGS—Shake Out

Diamond Clamp & Flask Co., Richmond, Ind.

TOOL GRINDERS

Tabor Mfg. Co., The, 6225 Tacony St., Philadelphia.

TOOLS—Pneumatic

Buckeye Portable Tool Co., 135 Wayne Ave., Dayton, O.
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland O.
Rotor Air Tool Co., 5900 Carnegie Ave., Cleveland, O.

TORCHES AND BURNERS—Acetylene, Blow, Oxy-Acetylene

Imperial Brass Mfg. Co., 1200 W. Harrison St. Chicago, Ill.,
Oxweld Acetylene Co., Newark, N. J.

TRACK & RAIL SUPPLIES

Bethlehem Steel Co., Bethlehem, Pa.

TRACKS—Overhead

Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.

TRACTORS—Industrial

Clark Tructractor Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS

Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, O.
Louden Machinery Co., Fairfield, Iowa.
Whiting Corp., The, Harvey, Ill.

TROLLEYS

Chisholm-Moore Hoist Corp., (Division of Columbus-McKinnon Chain Co.), Fremont Ave., Tonawanda, N. Y.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Harnischfeger Corp., 3800 National Ave., Milwaukee, Wis.
Louden Machinery Co., Fairfield, Iowa.

TRUCKS—Electric, Industrial

Whiting Corp., The, Harvey, Ill.

TRUCKS—Foundry

Whiting Corp., The, Harvey, Ill.

TRUCKS—Industrial

Clark Tructractor Co., Battle Creek, Mich.
Sterling Wheelbarrow Co., Milwaukee, Wis.

TRUCKS—Welding

Oxweld Acetylene Co., Newark, N. J.

TUMBLING BARRELS

American Foundry Equipment Co., 400 Byrkit Ave., Mishawaka, Ind.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Koven, L. O., & Brother, Inc., 154 Ogden Ave., Jersey City, N. J.
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corp., Hagerstown, Md.,
Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.
Scully-Jones & Co., 2012 W. 13th St., Chicago, Ill.
Sly, W. W., Mfg. Co., 4702 Train Ave., Cleveland, O.
Whiting Corp., The, Harvey, Ill.

TURBO BLOWERS—See Blowers

TURNTABLES

Whiting Corp., The, Harvey, Ill.

VALVES

Westinghouse Traction Brake Co., Wilmerding, Pa.

VALVES—Back Pressure

Oxweld Acetylene Co., Newark, N. J.

VALVES—Blow-off and Cut-off

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

VALVES—Foot and Knee

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

VALVES—Pneumatic

Cleveland Pneumatic Tool Co., The, 3734 E. 78th St., Cleveland, O.

VARNISH CANS—For Pattern Shops

Diamond Clamp & Flask Co., Richmond, Ind.

VENTILATING SYSTEMS

Drying Systems, Inc., 1801 Foster Ave., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Swartwout Co., The, 18531 Euclid Ave., Cleveland, O.

VIBRATORS

Adams Co., The, 175 Foster St., Dubuque, Iowa.
Arcade Mfg. Co., Dept. D, Freeport, Ill.
Hanna Engineering Works, 1761 Elston Ave., Chicago, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Pressed Steel Co., Muskegon, Mich.
Tabor Mfg., Co., The, 6225 Tacony St., Philadelphia.

VIBRATORS—Electric

Pressed Steel Co., Muskegon, Mich.

VISES

Western Tool & Mfg. Co., The, Springfield, Ohio.

WASHING MACHINES FOR METAL PARTS

Ransohoff, N., Inc., W. 71st and Mill Creek, Carthage, Cincinnati.

WAX—Core, Wire, Pattern, Vent

American Vent Wax Co., 64 Market St., Lockport, N. Y.
McCormick, J. S., Co., 25th & A.V.R.R., Pittsburgh, Pa.
United Compound Co., 228 Elk St., Buffalo, N. Y.

WEDGES—Foundry

Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., Milwaukee, Wis.

WELDING—Gas

Prest-O-Lite Co., Inc., 30 E. 42nd St., New York City

WELDING AND CUTTING Apparatus and Supplies—Oxy-Acetylene

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago
Oxweld Acetylene Co., Newark, N. J.

WELDING AND CUTTING EQUIPMENT—Electric Arc

General Electric Co., Schenectady, N. Y.

WELDING FLUXES

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Oxweld Acetylene Co., Newark, N. J.

WELDING RODS AND Wire

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Oxweld Acetylene Co., Newark, N. J.

WHEELBARROWS

Sterling Wheelbarrow Co., Milwaukee, Wis.

WHEELS—Grinding—See Abrasive Wheels

WHEELS—Wire

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

WIRE—Welding—See Welding Rods and Wire

WIRE AND CABLE—Electric

General Electric Co., Schenectady, N. Y.

WIRE BRUSHES—See Brushes—Wire

WIRE CLEANING Wheels

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

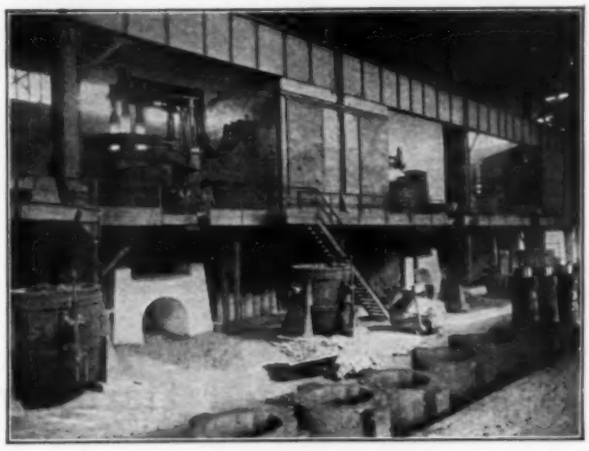
WIRE NAILS

Bethlehem Steel Co., Bethlehem, Pa.

WOOD PRESERVATIVES

Lindsay-McMillan & Co., 930 S. Water St., Milwaukee, Wis.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



Electric Furnaces
HEROULT TYPES

Fabricated
STRUCTURAL STEEL
for Every Purpose

Steel Structures of All Classes, particularly

BRIDGES
and
BUILDINGS

Also Steel Barges for Harbors and Rivers, Steel Towers for Electric Transmission

Turntables, Continuous and Cantilever Types

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

GENERAL OFFICES—71 BROADWAY, NEW YORK, N. Y.

Offices in Principal Cities

CANNON INTERCHANGEABLE
Flask Pins and Bushings
Hardened and Ground

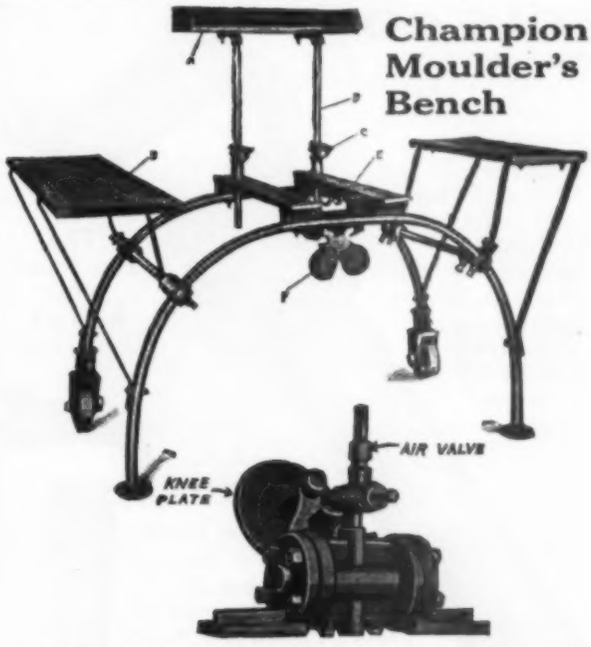
Save time, trouble, money—and speed up production by using CANNON Interchangeable Flask Pins and Bushings. They do away with the bother of bent or broken pins and lengthen life of flasks which would otherwise be thrown away because of broken pins.

Send for information

MICHIGAN SCREW CO.
Lansing, Mich.

*3

Champion Moulder's Bench

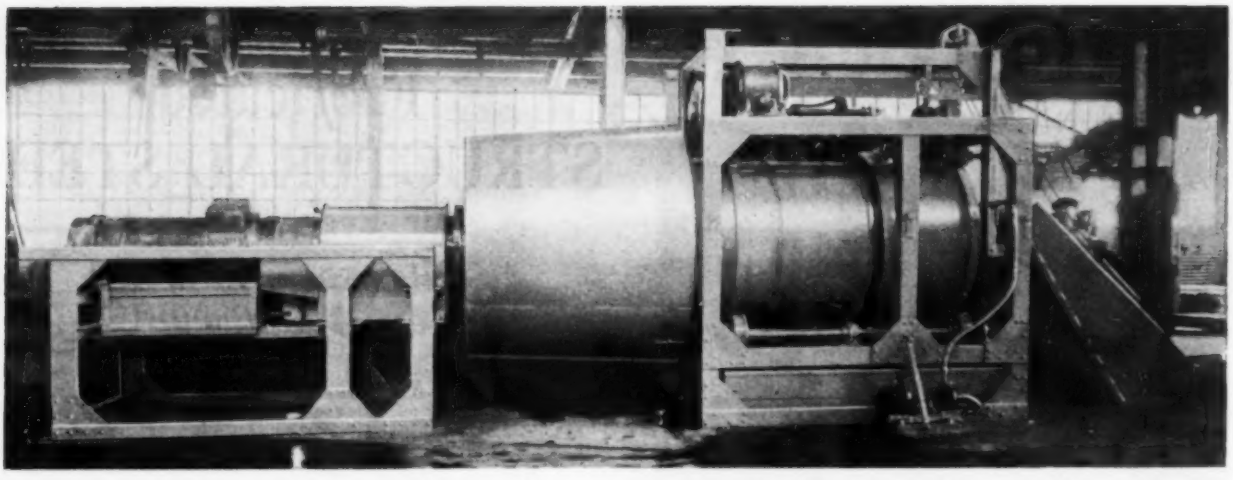


The bench is in itself unique in design, workmanship and material. The bow-frame is made of wrought-iron pipe, size outside diameter, 1¾ inches; the braces are of the same material, one size smaller.

The construction affords the greatest strength; eliminates weight, leaves the least chance for sand to lodge, and by noting the cut it will be observed that no brace is placed in the way of the workman's shovel.

The frame is rigid, as if cast in one piece. The skids are guaranteed to carry 1,000 pounds, and the side shelves 200 pounds each. Furnished with or without vibrator.

The Western Tool & Mfg. Co.
Springfield, Ohio



The Problem of the Manufacturer of Galvanized Hardware

This standard 48" x 84" Ideal Barrel handles grey iron and malleable castings as well as drop forgings. From a lead-lined tank under the first unit an acid-proof pump forces acid over the work being tumbled.

As the work is discharged from the barrel it is rinsed by cold water sprays in a revolving screen.

It automatically passes into an Alcumite screen which drenches the parts with a 10% muriatic acid flux solution contained in a rubber-lined tank. After this operation the work is dried over the hot plate and is ready for galvanizing.

This unit has speeded production tremendously for James Mfg. Co., Fort Atkinson, Wisc. Maybe it can be applied to *your* problems—asking us involves no obligation.

Put it up to Specialists

N. Ransohoff Incorporated

W. 71st St. at Millcreek, Carthage, Cincinnati, O.

"CLECO"

THE NEW HIGH SPEED CHIPPER FASTEST LIGHTEST AND EASIEST HOLDING HAMMER MADE

IDEAL FOR CLEANING CASTINGS

—⊡—

"The Hammer that pleases Everybody"

Style A. K. CHIPPER

has a Rachet Handle Locking Device which attaches Handle to the Cylinder without using a Clamp Bolt. In all other respects is the same as "Style L" Illustrated.

STYLE "L"

STYLE A.K.

Write for Bulletin No. 727

Branch Offices in all the larger cities

THE CLEVELAND PNEUMATIC TOOL CO.

3734 E. 78th St., Cleveland, O., U. S. A. *3

MILWAUKEE MOLDING MACHINES

Milwaukee Foundry Equipment Co.
Milwaukee, Wis.

CORNERED STEEL GLOBE GRIT

Steel Blast Your Castings and SAVE MONEY

See our full page advertisement the first of each month — in The Foundry.

GLOBE H. C. CHILLED SHOT
GLOBE CORNERED STEEL GRIT

H.C. CHILLED GLOBE SHOT

Reg. U.S. Pat. Off.

Reg. U. S. Pat. Off.

The Globe Steel Abrasive Co., Dept. F, Mansfield, O., U.S.A. *2

Approved by 250 Plants

This Core Machine Increases Production.

We build Core Machines to suit your conditions.

Gas Stove Burners.
Plumbing Goods.
Intricate Cores.

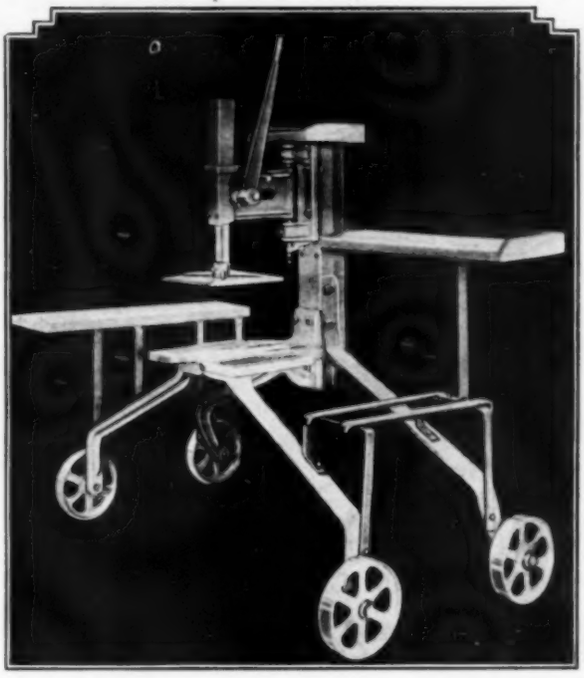
Correspondence Solicited

Wm. Demmler & Bros.

Kewanee, Ill.

Three Wise Men Came

"And by the light of that same Star,
Three wise men came from country far,
To seek for a King was their intent,
And to follow the Star wherever it went."



No. 4 HEAVY DUTY MACHINE (one of four models)

Wise men of the foundry trade today are turning to the Moline line of Squeezers, in greater numbers than ever before. Nor has their faith and confidence in these machines been misplaced. They are the last word in *increasing production* —and at a *lower cost.*

"It's easy to make *GOOD* castings on MOLINE SQUEEZERS"

Write today for complete catalog and further details

Moline Iron works
Moline, Illinois
U. S. A.

The ARTISAN
Super-Safety Shoe

Patents in the U.S. and Canada Acclaimed by Safety Engineers and Insurance Inspectors as the best, safest, most durable and economical shoe in the industrial world.

The Artisan Way is the highway of safety. We service the shoe for the life of the shoe.

Catalog on request.

Rohrbacher Shoe Co.
60 South Street, Boston, Mass.

Pulmosan Air-Supplied
SAND BLAST HELMET No. 64

***Double* Thickness Interlined Rubber Player Cloth**

•

Aluminum Skeleton Head Frame

•

Furnished with Wire Screen or Glass, as Specified

•

Pulmosan Safety Equipment Corp.
Anything and Everything for Safety
170 Johnson St. Brooklyn, N. Y.
Pin Coupon to Your Letterhead for DETAILS

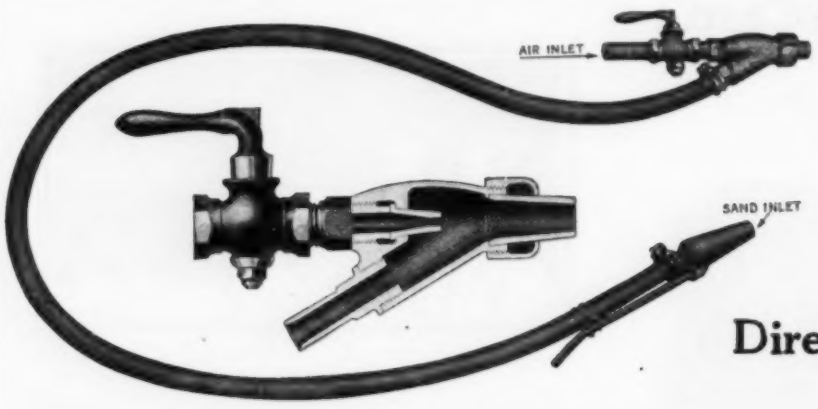
Pulmosan Safety Equipment Corp.
170 Johnson St., Brooklyn, N. Y.

GENTLEMEN:

Send me the details on the sand blast helmet No. 64.

Firm .....

Address .....

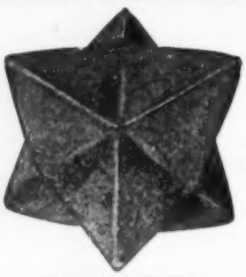


Cyclone Suction Sand Blast Nozzles

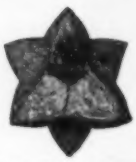
for Cleaning Gray Iron, Steel and Brass Castings, Structural Steel and Stone or Brick

Simple, inexpensive in cost and operation

Direct Separator Co., Inc.
Syracuse, N. Y.



HEAVY TYPE



LIGHT TYPE

5 POINT

WHITE IRON STARS

MAXIMUM RESULTS AT MINIMUM COST

COMPLETE STOCKS

1030 W. 38th St.
Chicago, Ill.

THE JOHNSTON & JENNINGS CO.
CLEVELAND, OHIO

PROMPT SHIPMENT

3896 Lonyo Road
DETROIT, MICH.

BOURNE-FULLER

GAGGERS

OPEN HEARTH

NEW BILLET STOCK

Rolled from *O. H. New Billet Steel* means *less breakage*, with *lower cost per gagger used.* ⅜ and ½ inch round and square—⅝ inch round. Any length leg, toe or hook. *Prompt shipments in any quantity.*

THE BOURNE—FULLER CO.
CLEVELAND, OHIO, U.S.A.
From the Ore to the Finished Product

HOEVEL SANDBLAST MACHINES

DUSTLESS AUTOMATIC — SELF-CONTAINED

We manufacture All Types of Equipment also Tanks, Sheet Steel Pipe, Stacks, Vats, Sinks and Special Plate Steel Work

L. O. Koven & Brother, Inc.
154 Ogden Ave. Jersey City, N. J.

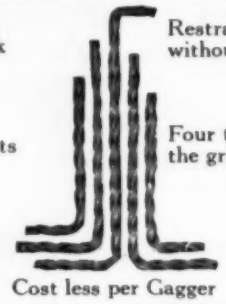
"FRANKLIN" TWISTED GAGGERS

(TRADEMARK—REG. U. S. PAT. OFF.)

Tough Stock — Restraighten without breakage

No Drop-outs — Four times the grip

Ram tight — Bed evenly



Cost less per Gagger

FOR LOWER COSTS!

Supplied thru Foundry Supply Agents or directly by

FRANKLIN CORE ROD & GAGGER CO.
FRANKLIN, PENNA.

TWISTED FOUNDRY STARS

PAT. NO. 1682246

Tempered Steel Shear blade hardness throughout

12 Cleaning edges

8 Points

Long Life

Better cleaning at lower cost

Why you should specify the "MORSE" Rarefied Dust Collector:

Its rugged all-metal construction assures a lifetime durability. There are no moving parts, and no screens or cloths to fill up and cut through. Cutting out of the fan is unnecessary, since the collector is between the fan and the dust source.

Our engineering staff will be glad to analyze your dust conditions and suggest a solution for them. Write for full details.

The Knickerbocker Co.
516 Liberty Street, Jackson, Mich.

"SERVRITE" Tumbling STARS

A high grade product made in a size and style to give maximum production and right finish on every class of castings.

Write for bulletin.

Ervin Foundry & Mfg. Co.
Adrian, Mich.

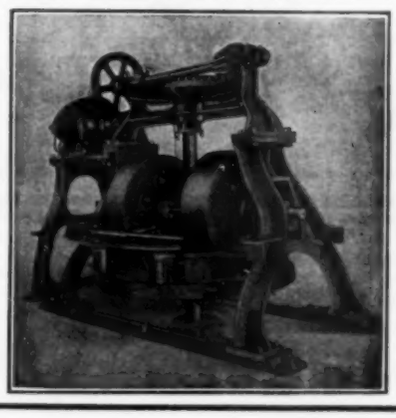
PHILLIPS & McLAREN CO.

We manufacture

Grinding Pans

of all types and sizes for Steel, Gray Iron and Malleable Foundries

24th and Smallman Sts., Pittsburgh, Pa.



Dry Air Better

With Gast Separators for compressed air

THERE isn't any doubt about Gast Air Separators doing a better job of drying your compressed air. You can see them work, and you'll be dumfounded by the amount of oil and water these efficient, inexpensive units remove. The protection they give your pneumatic tools and machines speeds up production and cuts maintenance costs to a minimum.

Gast Separators are simple, durable, and easily installed. They have no moving parts but strip the air of all moisture by passing it through several layers of coarse brass screen. They are so good we'll gladly let you try one yourself for 30 days. No charge and no obligations. *Write for details.*

Smith-Monroe Company
1910 S. Main Street
South Bend, Indiana

European Branch Office:
London, Adelaide House, E. C. 4.

"You can do it better with Gast"

F12-15-Gray

Hardness Testing

with the SCLEROSCOPE gives you the advantage over your competitors. Our *booklet* on the Science and Testing of metals will be sent free on request.

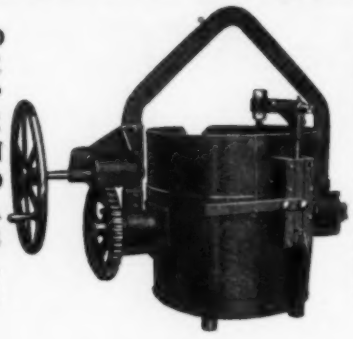
Heat Indications in the Foundry are now most successfully made with the Pyroscope. Inexpensive, simple, etc.

Pamphlet Free

The Shore Instrument & Mfg. Co.
Incorporated
Van. Wyck Ave. and Carll St. Jamaica, N. Y.

TIECO PRODUCTS

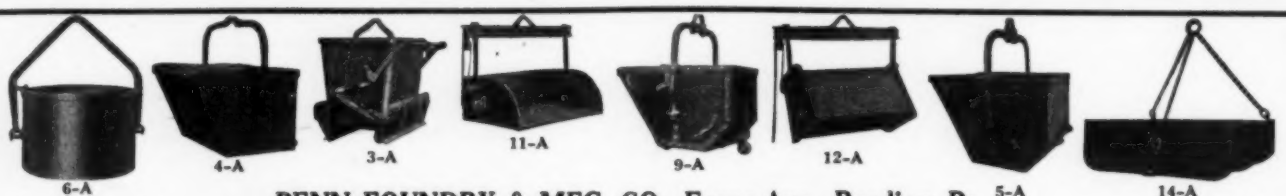
DEPENDABLE



SAFE STURDY

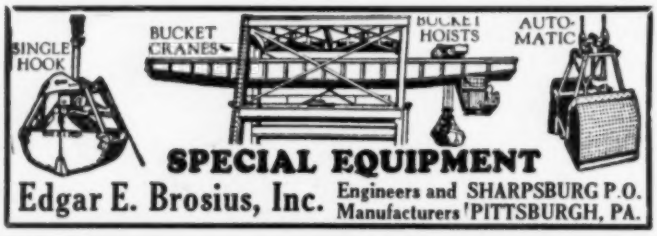
Ladles
Shanks
Tongs
Cars
Turntables
Special Equipment

The Industrial Equipment Co.
115 Ohio St.
Minster, Ohio
*3

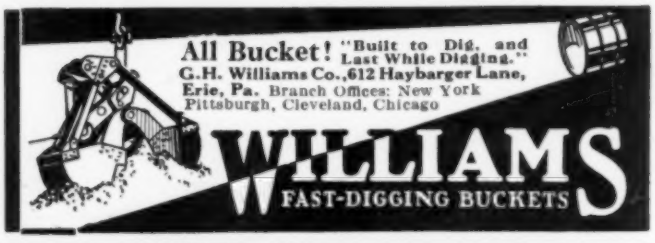


6-A *Dumping Buckets* 4-A 3-A 11-A 9-A 12-A 5-A 14-A *Cars and Trucks*

PENN FOUNDRY & MFG. CO., Evans Ave., Reading, Pa.



SPECIAL EQUIPMENT
Edgar E. Brosius, Inc. Engineers and Manufacturers SHARPSBURG P.O. PITTSBURGH, PA.

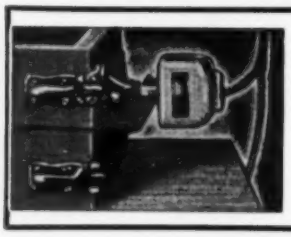

All Bucket! "Built to Dig, and Last While Digging."
G.H. Williams Co., 612 Haybarger Lane, Erie, Pa. Branch Offices: New York Pittsburgh, Cleveland, Chicago
WILLIAMS
FAST-DIGGING BUCKETS

Conco
TRAVELING CRANES and I-BEAM TROLLEYS.
WRITE FOR NEW CRANE DATA BOOK
H.D. CONKEY & COMPANY
37 Jefferson St., Mendota, Ill.
BUILDERS OF CONCO CRAWLER CRANES-OVERHEAD CRANES
THERE'S A SALES OFFICE NEAR YOU

Imperial
OXY-ACETYLENE
Welding and Cutting Equipment
Torches, Regulators, Acetylene Generators and Complete Outfits
Imperial Brass Mfg. Co., 1203 W. Harrison St., Chicago

BURY
AIR AND GAS COMPRESSORS
VACUUM PUMPS
ALL SIZES, ALL TYPES, ALL PRESSURES TO MEET ANY ENGINEERING REQUIREMENTS
BURY COMPRESSOR CO., 1746 Cascade St. ERIE, PA.

PENNSYLVANIA
The name PENNSYLVANIA is an invariable symbol of quality in Air Compressor construction.
Pennsylvania Pump & Compressor Co.
Easton, Pa.



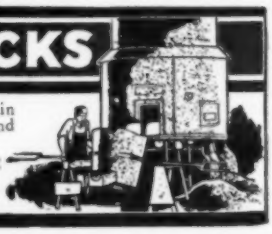
"L&A" ELECTRIC VIBRATOR
The original electric vibrator—and still first in effectiveness.
Send for full details.
The Pressed Steel Co.
Muskegon, Mich.

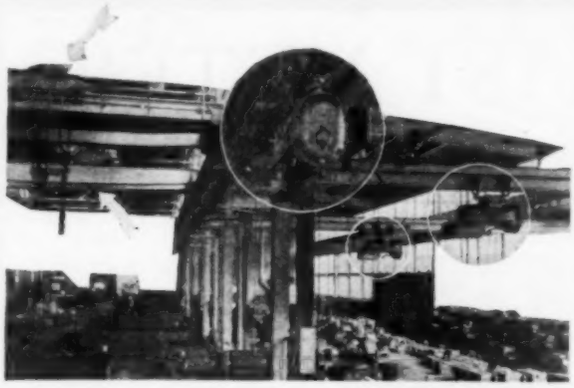
Crucibles
ROSS-TACONY CRUCIBLE CO
TACONY PHILADELPHIA, PA.
Stopper Heads
ESTABLISHED 1871

HAUCK TRADE MARK

Oil Burners
for
Cupola lighting Mold drying
Ladle heating Core Ovens
Write us about your foundry heating problems.
Our experience is at your service without obligation
Hauck Manufacturing Company
131 Tenth Street Established 1900 Brooklyn, N. Y.

CUPOLA BLOCKS
FIRE BRICK
USRCO and Savage Mountain Fire Clay Brick, Fine Ground Fire Clay.
United States Refractories Corp. *2
Mount Union, Pa. *Pittsburgh Office: Oliver Bldg*





BOX CRANES & HOISTS
mean Steady Production

. . . and this explains why Box Hoisting Equipment is chosen for *Foundries*. Box Load Lifter Electric Hoists are impervious to Foundry fumes and gases; they operate on AC or DC, are ball bearing equipped and fitted with 1-point forced feed and splash lubricating systems. Having a fine and accurate load control, Load Lifters are suitable for fractional manipulation in pickling rooms, molding and pouring, etc. 500 lbs. to 5 tons.

Box Type "C" Electric Traveling Cranes are "standardized" from only 3 frame sizes of machinery units, produced continuously in large quantities at mass production costs. The resulting economies are yours. . . . Investigate Box Utility and Economy. Write for Bulletins.

BOX CRANE & HOIST CORPORATION

2226 E. Ontario Street
Philadelphia — Penna.

Member EIMA

Established 1878

"One of the Pioneer Crane Builders"

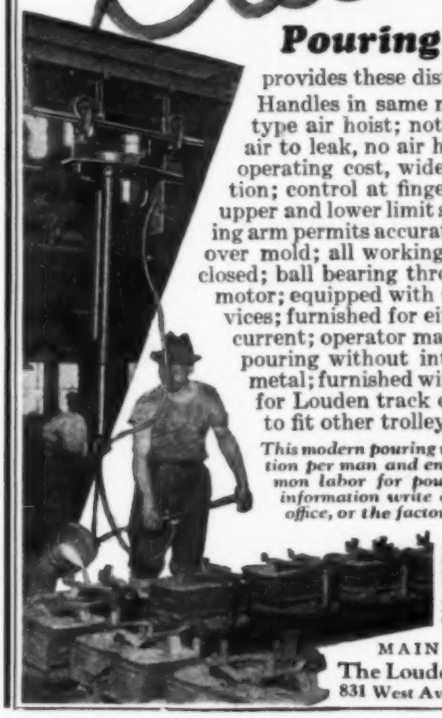
Member EIMA

The New LOUDEN
Electric
Pouring Device

provides these distinctive features:

Handles in same manner as vertical type air hoist; nothing to freeze, no air to leak, no air hose to drag, lower operating cost, wider range of operation; control at finger tip of operator; upper and lower limit switches; rigid lifting arm permits accurate spotting of ladle over mold; all working parts totally enclosed; ball bearing throughout, including motor; equipped with G.E. electrical devices; furnished for either A.C. or D.C. current; operator may raise ladle while pouring without interrupting flow of metal; furnished with Louden trolleys for Louden track or Super Track, or to fit other trolleys.

This modern pouring unit increases production per man and enables the use of common labor for pouring. For immediate information write or phone our nearest office, or the factory direct.



OFFICES

Boston	Philadelphia
New York	Cincinnati
Buffalo	Cleveland
Pittsburgh	St. Louis
Detroit	Los Angeles
Chicago	SanFrancisco

MAIN FACTORIES

The Louden Machinery Co.
831 West Ave. Fairfield, Iowa

ACCEPT NO SUBSTITUTE

Sterling

—"self-lubricating" axle bearing—*guaranteed for the barrow's life*—means longer service and easier wheeling

No. 28—heavy duty, strongest built, Double thick tray bottom and wheel tread. Capacity 3½ cu. ft.

No. 11—coal and ash type. Capacity 6 cu. ft. or 350 lbs. Easiest wheeling big load barrow made. Built extra strong and rigid for tough work.

No. 25—for coke or bulky material. Capacity 9 cu. ft. or 7 bushel. Balance load design and self-lubricating axle bearings makes easy wheeling.

No. 17—for pig iron or metal ingots. Capacity 1000 lbs. Strong, rigid and designed for severe service. *Yes, easy wheeling.*

No. 18—charging. So perfectly balanced that a 1000 lb. load can be easily handled. Also used for wheeling castings. Built extra strong and rigid—long life.

The above are but a few of the many, many Sterling barrows — Sterling also builds the *only "rolled steel"* flask and other foundry specialties—*Why not write for a complete catalog?* Branch offices and *big-stock-prompt-shipping* warehouses are maintained in *Boston — New York — Philadelphia — Pittsburgh — Cleveland — Detroit — Chicago — St. Louis*

STERLING FOUNDRY SPECIALTIES, LTD., BEDFORD, ENGLAND

Manufacturers of Sterling "Rolled Steel" Flasks for England and other European Foundries.

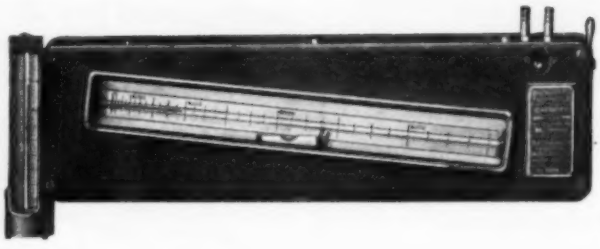
STERLING WHEELBARROW COMPANY

Milwaukee Wisconsin

BACHARACH BLAST METERS

The simplest form of instrument for keeping a close check on your cupola blast.

The right volume of air means the highest melting rate at the lowest coke consumption.



Gives a continuous reading in terms of cubic feet of air delivered to the cupola.

The right volume of air means uniform temperatures with long life of cupola lining.

"Operate your cupola economically"

Write for Bulletin 3091

BACHARACH INDUSTRIAL INSTRUMENT CO.

7004 BENNETT ST. PITTSBURGH, PA.

YOU WILL BE INTERESTED

in our thirty-two page illustrated booklet dealing with Aluminium Alloys, Mixing, Melting and Casting.

Write us for "Light Alloys in the Foundry".

THE BRITISH

Aluminium

COMPANY LTD.

122 East 42nd Street New York
380 Adelaide St. W. Toronto

Pilling & Company, Inc.

Pig Iron, Coke & Alloys

Philadelphia	New York	Boston	Pittsburgh
1500 Chestnut St.	11 Broadway	80 Federal St.	Oliver Bldg.

Hillman Coal & Coke Co.

STANDARD CONNELLSVILLE LOW SULPHUR

FOUNDRY COKE

First National Bank Bldg., PITTSBURGH, PA.

NICKEL

Distributors of International Nickel Co. products

"F" SHOT — Low melting point (2300°F.) For gray Iron ladle additions.

XX SHOT NICKEL COPPER ALLOYS X INGOT

FERROCHROME

High and Low Carbon Lump and Ground
For ladle additions.

Williams & Company, Inc.

901-937 Pennsylvania Ave.
PITTSBURGH

CLEVELAND 1748-56 E. 22nd St. CINCINNATI 2118 Spring Grove Ave.

"Join the Gray Iron Institute"

Here is one New Year's Resolution it would be easy and profitable for you to make and keep:

"During 1930, we will buy only Semet-Solvay Foundry Coke and thus end our worries over uniform analysis, quality and deliveries."

SEMET-SOLVAY Co.
61 Broadway New York, N. Y.
Detroit Buffalo
Cleveland Cincinnati
Birmingham—Adams Rowe & Norman, Agents
Toronto—The Standard Fuel Co., Ltd., Agents

Semet-Solvay
FOUNDRY COKE

THE M.A. HANNA CO.

HANNA PIG IRON

The M.A. HANNA Co.
Sales Offices:
CLEVELAND
Buffalo, Detroit, Cincinnati

A MERRY CHRISTMAS and A HAPPY NEW YEAR

Indiana Consumers Gas & By Products Co. Terre Haute, Ind.

Manufacturers of
Dependable Foundry Coke

Lower Your Scrap Loss

by using

Foundry Advisory Service

in

Molding and Metallurgical Problems

Sand Control

H

Chemical, Physical and Microscopic Tests

Robert W. Hunt Company

General Offices and Laboratories

22nd Floor—Insurance Exchange

CHICAGO

All Large Cities

Swindell FURNACES for FOUNDRY SERVICE

OPEN HEARTH MELTING FURNACES FOR STEEL AND MALLEABLE CASTINGS

AIR FURNACES
For Grey Iron and Malleable

ANNEALING FURNACES
For Steel and Malleable Castings

ELECTRIC FURNACES
For Melting and Annealing

CORE OVENS

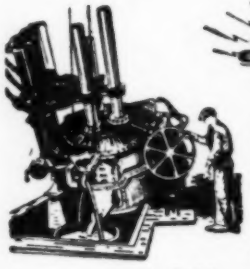
MOLD DRYING OVENS

Wm. Swindell and Brothers
PITTSBURGH, PA.

Moore Rapid

Lectromelt

Furnaces



stand supreme for economical production of Tool Steels, Alloy Steels, Steel Castings, Gray and Malleable Iron. Basic and Acid Operation.

Ask 'Lectromelt Users.

Pittsburgh Electric Furnace Corp.
P. O. Box 1125 Pittsburgh, Pa.
Electric Furnaces—Good Furnaces Only

CHARLES VICKERS

1110 Main St.
BUFFALO, N. Y.

Consulting Brass Foundry Specialist

Brass Foundry Surveys made and Advisory Reports Presented Regarding Layouts, Operating Methods, Castings Losses, Melting and Ventilation Problems.

Metal Mixtures Reviewed to Determine if Cheaper Alloys can be Substituted.

Fisher Furnaces

for melting

Brass—Bronze—Aluminum

Oil or Gas Fired

Alfred Fisher Furnaces, Inc. 762 W. Adams St. Chicago, Ill.

EDWIN S. CARMAN, INC.

Engineers

Carnegie Hall, Cleveland, Ohio

Plant Design — Plant Remodeling — Consulting —Surveys — Reports

Specializing in foundry operation—continuous systems, sand treating, sand testing, machine molding, cost reduction.

Foundry Metallurgists & Chemists

Foundry Investigations

Analyses

A. H. Putnam Co. City Hall Bldg. Rock Island, Ill.

Foundry Manganese Co.

Ferro Manganese.....80%
Ferro Silicon 50%
Ferro Chrome..1 to 2% carbon
Prepared to any desired size

Works
CONSHOHOCKEN PA.

Office
200 Harrison Bldg.
Philadelphia

BORONIC ALLOYS

have been in use for 15 years

American Boron Products Co., Inc.
Buffalo, N. Y., U. S. A.

Aluminothermic Metals and Alloys

25% Ferro-Titanium; many others.

Write for pamphlet No. 2030

Metal & Thermit Corporation
120 Broadway, New York
Pittsburgh Chicago Boston S. San Francisco Toronto

Classified Ads

Help Wanted

WANTED

By Electric Steel jobbing foundry in California, a young foundry foreman who has had practical experience in green and dry sand molding, and who can estimate production from blueprints. This man will be first assistant to superintendent and will require a good personality in order to meet the trade whenever called upon to do so. Only high-class permanent men, whose record will bear the closest investigation, need apply. In replying, state full experience in detail, age, single or married and salary expected. Address Box 101, THE FOUNDRY, Cleveland.

METAL PATTERN MAKER

Wanted, an experienced metal pattern maker for coal, gas and furnace pattern work. ENAMEL & HEATING PRODUCTS LIMITED, SACKVILLE, N. B., CANADA.

GENERAL FOREMAN WANTED

Top notch experienced foundry foreman needed at once for large gray iron foundry in New England. Must be young man with real executive ability, thoroughly competent to produce high grade castings. Machine tool experience preferred. Write full qualifications to Box 124, THE FOUNDRY, Cleveland.

WANTED

Live, middle aged, salesman, well acquainted with manufacturing trade, to sell Steel Castings in Kansas, Oklahoma, and Northern Texas. Part or full time on commission. Address Box 150, THE FOUNDRY, Cleveland.

WANTED

Live, middle aged, salesman, well acquainted with manufacturing trade, to sell Steel Castings in Illinois, Indiana, Tennessee, Kentucky. Part or full time on commission. Address Box 147, THE FOUNDRY, Cleveland.

IF YOU ARE OPEN TO OVERTURES FOR new connection, and qualified for a salary between $2500 and $25,000, your response to this announcement is invited. The undersigned provides thoroughly organized service, of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirement; your identity covered and present position protected. Established twenty years. Send only name and address for details. R. W. Bixby, Inc., 101 Downtown Building, Buffalo, New York.

FOUNDRY SUPPLY SALESMAN

to work out of Los Angeles. Drawing account against liberal commission. Give complete information regarding past experience, references, etc. Vacancy expected about January. All replies will be held confidential. Address Box 149, THE FOUNDRY, Cleveland.

WANTED

Ambitious foundry foreman to take part interest in going gray iron jobbing foundry. A splendid opportunity for the right man to get into a well established, profitable business. Approximately $2500.00 required. Address Box 146, THE FOUNDRY, Cleveland.

WANTED

A capable superintendent to operate a medium sized gray iron foundry making small automobile parts. Only men capable of earning a very good salary and worthy of advancement need apply. Must also be willing to live in a small city. Address Box 145, THE FOUNDRY, Cleveland.

CLASSIFIED RATES

For Sale, Wanted and Miscellaneous advertisements 10c per word, minimum advertisement $3.00.

Help Wanted advertisements; minimum ad, 50 words $3.00; additional words 6c each.

Position Wanted advertisements; minimum ad 30 words, $1.50, additional words 5c each.

First line is set in bold face type.

A box address counts as six words.

Those desiring to give special prominence to their advertisements may buy space by the inch and have their advertisements appear in bold face type with white space at top and bottom, at the following rates:

Single Column 2¼" Wide	1 Time	3 Times	6 Times	12 Times
1" S. C.	$ 8.25	$ 7.50	$ 6.75	$ 6.25
2" "	15.00	13.75	12.50	11.25
3" "	21.50	20.00	18.00	16.00
4" "	27.50	25.00	22.50	20.00
5" (⅓ col.)	33.75	30.00	27.00	24.00
6" S. C.	40.00	36.00	32.00	28.00
7" "	45.00	40.50	36.00	31.50
8" "	50.00	45.00	40.00	35.00
10" (1 col.)	60.00	54.00	48.00	42.00
15" (½ page)	90.00	80.00	70.00	60.00
30" (1 page)	160.00	140.00	120.00	100.00

Count 10 lines to the inch for actual type matter and allow accordingly when white space is desired.

THE FOUNDRY is published on the 1st and 15th of each month. Copy for the classified section should reach us twelve days before date of issue.

Help Wanted

COREROOM FOREMAN WANTED

On jobbing and production cores, oil and compound, gray iron. State age, experience, open or closed shop and salary expected. Location, Middle West. Address Box 144, THE FOUNDRY, Cleveland.

WANTED
TO LIST WITH US

steel and iron foundry foremen, superintendents, metallurgists, salesmen, production managers, supervisors, inspectors, patternmakers, cupola, electric and open hearth melters.

McLAIN'S SYSTEM INC.
805 Goldsmith Bldg.
Milwaukee, Wis.

WANTED

Expert cleaning room foreman for steel foundry. Give references and salary expected. Address Box 152, THE FOUNDRY, Cleveland.

GENERAL SUPERINTENDENT

Wanted at once for well established stove plate foundry. Must be energetic and able to produce. State experience, age, reference, married or single, nationality and salary expected. Address Box 154, THE FOUNDRY, Cleveland.

WANTED

Salesman, to sell gray iron and semisteel castings of all descriptions. Prefer one familiar with clay and power plants. Ohio and Pennsylvania territory. State age and salary. Address Box 121, THE FOUNDRY, Cleveland.

Positions Wanted

FOUNDRY FOREMAN

A practical foundry foreman desires new connection in alloy steel foundry. Up to date in modern molding. Address Box 141, THE FOUNDRY, Cleveland.

SUPERINTENDENT

15 years experience managing iron and nonferrous shops. Practical all departments estimating to finished castings. Can lay out permanent molds for aluminum. American, available short notice. Address Box 136, THE FOUNDRY, Cleveland.

MALLEABLE FOUNDRYMAN

First class on quantity production. 12 years as assistant to superintendent, would like to correspond with going concern. Good on blueprints. Age 40 years. Address Box 148, THE FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT SPECIALIZING in semisteel and gray iron desires a new connection. Wide range of experience in pattern and foundry work, all classes of molding machines and sand slingers, can estimate from blue prints for jobbing trade. 20 years experience, twelve as executive of pattern and foundry. Age 38. Married. Middle West preferred. Address Box 138, THE FOUNDRY, Cleveland.

COST ACCOUNTANT

with experience as assistant manager of gray iron, boiler and radiator foundry. 200 tons per day. 15 years experience. Age 39. Would like to start January 1 in either cost or manufacturing departments. Have been successful in reducing factory costs. Address Box 143, THE FOUNDRY, Cleveland.

COREROOM FOREMAN DESIRES POSITION with live foundry. Reference if desired. Address Box 139, THE FOUNDRY, Cleveland.

BRASS FOUNDRY FOREMAN DESIRES POSITION. 18 years practical experience as molder and foreman on chandelier castings, valves, jobbing and production. A working foreman. Address Box 155, THE FOUNDRY, Cleveland.

WOOD PATTERNMAKER

Experienced wood patternmaker desires position. Will reply to all inquiries. Address Box 142, THE FOUNDRY, Cleveland.

PRODUCTION OR FOUNDRY MANAGER

Young man, 33 years old, married. Past twelve years with foundry doing general jobbing work on production piece work basis. Competition and service are my great factors. Am positive I can pep up your foundry superintendent. Gray iron foundry preferable but will consider anything where there are possibilities and a permanent position. Twenty years in foundry game. Coremaker and molder by trade. Can handle any kind of labor. File finish face die castings a specialty. Address Box 151, THE FOUNDRY, Cleveland.

POSITION WANTED

As brass foundry superintendent. Experience is general, of long duration, light and heavy castings in production line, especially in automotive castings, bushings, etc. Up to date on equipment and modern foundry practice. Good executive, can handle large working force, will be open for engagement January 1, 1930. Address Box 137, THE FOUNDRY, Cleveland.

Classified Ads

Positions Wanted

ELECTRIC STEEL MELTER
with seven years experience on alloy steels desires position. Experience includes basic practice on Moore Electromelt furnaces. Now employed. References. Address Box 122, THE FOUNDRY, Cleveland.

A TECHNICALLY TRAINED MALLEABLE iron foundryman desires new connection. Well versed in practical end of business. Well acquainted with personnel of large buyers of malleable in his territory. Experienced as an executive. Age 30. Prepared to furnish best of references. Address Box 133, THE FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT OR FOREMAN OPEN FOR NEW CONNECTIONS. BROAD EXPERIENCE IN GRAY IRON AND SEMI-STEEL. SMALL AND MEDIUM HEAVY CASTINGS. CAPABLE IN RIGGING AND PATTERN EQUIPMENT FOR MAXIMUM PRODUCTION. HAVE PATTERN SHOP EXPERIENCE. CAPABLE OF MAINTAINING AN EFFICIENT ORGANIZATION. MIX BY ANALYSIS. ADDRESS BOX 119, THE FOUNDRY, Cleveland.

MASTER MECHANIC, FIFTEEN YEARS EXperience in modern steel foundries, in maintenance of mechanical and electrical equipment. Also the efficient operation and construction of large electric furnaces. Address Box 979, THE FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT
open for engagement. Twenty-six years practical experience on high grade castings, light and heavy. Up to date on modern production, melt by analysis, nickel-chrome cast iron. Fifteen years as foreman and superintendent. Have technical education. Can handle machine and pattern shop also. Address Box 125, THE FOUNDRY, Cleveland.

FOUNDRY MANAGER OR SUPERINTENDENT
Practical and technical man. Wants to locate in Cleveland, Ohio or this district. Have handled foundry, machine and pattern shop as Production Manager. Estimate from blue prints. Mix iron by analysis. A1 cupola practice. Green, dry sand and loam. Bench or machine. Jobbing or production. Anxious to locate and would consider anything with responsibility. Address Box 975, THE FOUNDRY, Cleveland.

PRACTICAL SUPERINTENDENT WITH over 30 years of foundry experience and an efficient executive, desires position. Mix gray iron and semisteel by analysis. Can handle castings from the smallest to the heaviest made. Green, dry sand and loam. Address Box 106, THE FOUNDRY, Cleveland.

MAINTENANCE ENGINEER
Fifteen years experience in gray iron, semisteel and malleable iron foundries. Address Box 126, THE FOUNDRY, Cleveland.

LIGHT GRAY IRON FOUNDRY FOREMAN
desires position with good production firm. Good executive ability, can handle any class of men. Have record for production and system. 22 years experience, 38 years old and married. Address Box 998, THE FOUNDRY, Cleveland.

STEEL FOUNDRYMAN, AGE 48, DESIRES a new connection with firm who are not earning the profits they should. Up-to-date in most modern methods of production, well versed in all details to the successful operation of plant. Address Box 882, THE FOUNDRY, Cleveland.

Positions Wanted

FOUNDRY WORKS MANAGER
A practical and technically trained executive with twelve years diversified experience in executive capacity manufacturing electric motors, stampings, ranges, boilers, radiators and furnaces, desires a new connection as works manager or superintendent.

Thoroughly grounded in administration, engineering and production. Have had more than ordinary experience in modern manufacturing methods, cost reduction and production control. Not a "buyer" but a level-headed go-getter, capable of getting maximum results from your present manufacturing facilities.

At present employed as equipment superintendent with one of the large heater manufacturers, but due to an impending merger, present connection terminates this year.

Age 34, married. Minimum salary to start $6,000. Services available January 1. Address Box 156, THE FOUNDRY, Cleveland.

COREROOM FOREMAN
or assistant with 12 years experience covering brass and iron in capacity of foreman desires to locate position in Ohio. Well recommended. Address Box 986, THE FOUNDRY, Cleveland.

ATTENTION
FOUNDRY OWNERS!

Write or wire us for technically-trained, practical foundry foremen, superintendents, production managers, chemists, metallurgists, core foremen, cost clerks, salesmen, patternmakers, melters (electric, open-hearth, converter and cupola). No charge.

McLAIN'S SYSTEM, INC.
804 GOLDSMITH BLDG.
MILWAUKEE, WIS.

ALUMINUM AND BRASS FOUNDRY SUperintendent thoroughly familiar with the production of every kind of heat treated aluminum alloy castings is open for engagement. Well versed in modern production methods and cost figuring, college graduate with years of practical experience as molder. Experienced also with permanent mold castings. Address Box 110, THE FOUNDRY, Cleveland.

FIRST CLASS PLATE MOLDER DESIRES steady position. Twenty-two years foundry experience including work on aluminum plates and metal patterns of all sizes. Good references. Now employed. Address Box 131, THE FOUNDRY, Cleveland.

GRAY IRON FOUNDRYMAN, NOW EMployed, desires position as superintendent or general foreman. Twenty years practical experience, twelve years as executive. Experienced on small, medium and large castings. Open shop preferred. Age 41. Address Box 109, THE FOUNDRY, Cleveland.

FOUNDRY COST ACCOUNTANT DESIRES new connection. Competent accountant with a practical cost system. Experience also covers Federal Income Tax work. Best references. Address Box 869, THE FOUNDRY, Cleveland.

Positions Wanted

UNIVERSITY METALLURGICAL GRADUate, specialized on foundry, completes college work in January. Formerly first class molder, green sand, dry sand, loam. Wishes to start in operating or research with a large company, and has made intensive eight year preparation for this purpose. Recommendations from five Eastern foundries, including a year of foundry cost supervision. Good technical and practical training, adaptable in any foundry department. Married. Address Box 135, THE FOUNDRY, Cleveland.

POSITION WANTED
By experienced foundryman in gray iron, semisteel, alloy metals. Carbon steel and alloy steels in engine, machinery or general jobbing work. Can make strong clean iron castings without pig iron with alloy costing about $2.00 per ton. Address Box 127, THE FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT
or assistant or engineer in gray or malleable iron. Age 38. Married, technical education, practical experience in all classes of molding, expert in sand control, sand slingers, cupola practice, cost, quality and quantity production, an expert in time study systems, straight piece work and the May bonus system. Address Box 111, THE FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT
Practical and technical knowledge in production of gray iron and semisteel castings. Can cover all phases economically and efficiently. Open for immediate engagement. Address Box 130, THE FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDent or general foreman. Thoroughly practical in every detail of modern foundry practice. Experience covers all branches of foundry operations on gray iron castings of all kinds, production or general jobbing. 15 years in charge of stoves, furnaces, boilers and light jobbing. Address Box 968, THE FOUNDRY, Cleveland.

GENERAL MANAGER AND SALES EXECutive, with established record in successfully managing and building up foundry, machinery and allied industries desires position where his qualifications and previous experience will produce results. His experience includes directing responsibility for all office, sales, financial and factory activities. Address Box 115, THE FOUNDRY, Cleveland.

GENERAL SUPERINTENDENT OR FOREMAN
Practical brass and aluminum foundryman with 33 years experience in this work, 17 years as superintendent and foreman. Up to date in modern foundry practice, jobbing and production. A1 in melting of metals, also A1 melting by coke, oil, or electric. Address Box 100, THE FOUNDRY, Cleveland.

PATTERN FOREMAN
35 years of age. Eighteen years experience in wood and metal. Automobile experience. Wide knowledge of mounting, patterns for production and foundry practice. Six years as foreman and employed at present. Address Box 132, THE FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT
desires position with progressive organization. Eighteen years practical experience coremaking, molding, cupola practice and patternmaking. Twelve years superintendent. Expert rigger for production, any type casting. Married, age 38. Address Box 990, THE FOUNDRY, Cleveland.

Classified Ads

For Sale

FOR SALE
CUPOLA AND CONNERSVILLE BLOWER
No. 7 Whiting Cupola and Connersville Blower for same, may be seen at our Fostoria Foundry.

THE ELECTRIC AUTO-LITE CO.
Foundry Division
FOSTORIA, O.

FOR SALE
POSITIVE CUPOLA BLOWERS
2—No. 6½ melts 14 to 20 tons per hour
1—No. 6 melts 12 to 16 tons per hour
2—No. 3 melts 3 to 5 tons per hour
Modern and completely overhauled.
Write for special low prices on above or information on other sizes.

BLOWER COMPANY
810 W. Green St., Piqua, Ohio.

FOR SALE
2 Herman Jar Rollover
1 Tabor Jar Rollover
1 Sly Sand Blast Room
1 Pangborn Sand Blast Table
Complete Foundry Equipment at Bargain Prices. Located in Cleveland. Address Box 992, THE FOUNDRY, Cleveland.

MAGNETIC SEPARATOR FOR SALE
One Size No. 2 Type F. Magnetic Separator, with Bucket Elevator, manufactured by Magnetic Mfg. Co., Milwaukee, Wis. First class Condition. Sweet & Doyle Foundry & Machine Co., Troy, N. Y.

FOR SALE
3 Lowe Electric Riddles
2 Monarch Tilting Crucible Type furnaces
2 Monarch Simplex Rolling Type furnaces
3 Colman Aluminum furnaces
2 North American blowers—5 H.P.—12 oz. air
1 U. S. Air Compressor—30 ft. capacity full automatic.
1 30" American Blower exhaust fan.
Address Box 970, THE FOUNDRY, Cleveland

FOR SALE
Two 2000 lb. No. 94 Monarch, revolving, oil firing furnaces, complete with blowers and motors.

NATIONAL PRESSURE COOKER CO.
Eau Claire, Wis.

FOUNDRY EQUIPMENT DEPENDABLE, Money Saving, Guaranteed.—Blowers for Cupolas, Brass Melting, Smelting, Heat Treating and all Industrial Purposes. Send your specifications giving particulars. Air Compressors for Foundry Hammers, Rammers, Sand Blasts, Hoists, Core Blowing, Blow Guns, etc. Molding Machines, Magnetic Separators, Hausfeld Furnaces for melting or smelting 400 lb. to 2000 lb. per heat capacity. Booth 725 lb. Electric Furnace. Air Receivers, Cupolas, Cranes, Electric Hoists, Exhaust Fans, Machine Tools. Before buying send for our prices giving your specifications. Foundry Equipment Dealers for 15 years with satisfaction.

CLIFTON MACHINERY CO.
1023 West 6th St. Cincinnati, Ohio.

For Sale

FOR SALE
Two No. 150 Monarch tilting type crucible furnaces also two extra linings and covers for same. One Monarch double ladle heater. Practically new. The M. S. Little Mfg. Co., Hartford, Conn.

MOLDING MACHINES
1 Osborn No. 403-W Jolt Roll-Over Pattern Draw 12, flask cap. 52 x 36" lifting cap. @ 80 lbs. press. 1300 lbs., jolt cyl. dia. 8" with swing out Mold Table, power roll-over.
1 No. 28 Davenport Jolt Roll-Over Draw, 30 x 45" pattern draw 12", jolt cyl. dia. 8". 1500 lbs. cap. @ 80 lbs. pressure.
1 International Type "F" 26 x 16" comb. jar ramming, power turn-over, 1400 lbs. capacity @ 80 lbs. pressure.
1 International Type "JW" combination jolt ramming hand stripping, 18 x 26"—8" draw.
1 International Type "M" combination air jar, hand turn-over and foot draw, 18 x 8".
2 International Type R 22 x 8" draw, special turn-over with air turn-over cylinders, portable.

SQUEEZERS
2 No. 0 U. S. Comb. Jolt & Squeeze, stationary, 9" dia. squeeze cyl. 3½" dia. jolt cylinder, 15 x 21" table.
2 Osborn No. 74 Air Squeezer, dia. of cyl. 8½" distance between rods 30", 14 x 18" table.
1 Tabor, portable, 8" cyl. 30" between rods, size of table 16 x 16".
Lot Adams, portable, 30" between rods, single rod.

MISCELLANEOUS
1 Chg. Pneumatic Type NS-B, 7½ x 6, 106 ft. Comp. complete with lubricator and unloader.
1 Mott Hose Type direct pressure Sand Blast Tank 22 x 34", on legs, 1000 lbs. sand capacity.
1 Model "C" Royer Sand Separator and Blender, port. cap. 500 lbs. sand per min, with Motor.
1 E. W. Bliss "Stiles" No. 172 Power Sprue Cutter, cap. ⅞" round, ⅝ x 1½" flat brass gates.
1 2-ton single "I" Beam Shepard Bridge, consisting of 12" "I" Beam, span 18' 5" with structural steel trucks.
Send for List No. 58 containing complete stock of NEW and USED FOUNDRY EQUIPMENT available.

SCULLY-JONES & COMPANY,
19TH & ROCKWELL STS., CHICAGO, ILL.

FOR SALE
Having closed our foundry, we have for sale, sand-slinger, ladles, scales, cupola, jar ramming machines and other equipment. THE M. W. KELLOGG COMPANY, Jersey City, N. J.

U. S. STATIONARY MOLDING MACHINE, Jolt and Squeeze, used only one month. For sale very cheap. Address The Conway Company, Wyandotte, Mich.

REAL BARGAINS BEFORE REMOVAL
(1)—5½ Roots Blower, mounted on base plate with 35 H.P. Wagner slip ring motor.
(2)—Roeper Cranes, 2-ton, 18' 0" span, 2 motors.
(1)—Roeper Crane, 2-ton, 18' 0" span, one motor.
(1)—Box Crane, 2-ton, cage control, 25' 0" span, 3 motors.
(All above 220 volts, 3 phase, 60 cycle variable speed, foundry control.)
(1)—No. 6-A, Roots Blower with base plate.
(1)—8' x 10' Pangborn S. B. Room with dust arrester.
(1)—No. 2 Pangborn Sand Blast Barrel, type G. D.
(1)—No. 2 Standard Sand Mixer with motor.
(1)—650 cubic feet Sullivan Air Compressor.
Send for our lists of foundry equipment and cranes.

T. B. MacCABE
2230 W. Lippincott St. Philadelphia, Pa.

Foundries For Sale

FOR SALE
Complete plant. Able to handle castings up to 7 tons. Three cupolas, good machine shop, concrete floor, pattern shop and storage buildings. First class condition. $5000.00, balance $150.00 month. Northern California. Address Box 128, THE FOUNDRY, Cleveland.

FOR SALE
Foundry building 5000 sq. ft., railroad siding, Newark, N. J. Address Box 140, THE FOUNDRY, Cleveland, for particulars.

Opportunities

WANTED
To buy or lease small iron foundry suitable for molding machine work. Not over 10 lbs. With or without molding machines. Not to be over 100 miles from New York City. Address Box 118, THE FOUNDRY, Cleveland.

A FOUNDRY THAT IS GOING TO BUILD a Reverberatory Furnace for the purpose of reclaiming scrap metal, capacity 25,000 lbs. per melt, is interested in entering into negotiations with someone who has blueprints covering the same and will undertake the construction of it. Address Box 153, THE FOUNDRY, Cleveland.

EXCELLENT OPPORTUNITY
to secure exclusive manufacturing rights of a patented device, fitting perfectly into stove foundry or similar organization. Present sales guarantee $6,000.00 net profit annually to foundry, and it is only a start. Moderate cash investment required. Thorough investigation invited. Address Box 123, THE FOUNDRY, Cleveland.

Wanted

WANTED
Something to manufacture in our machine shop and sell to the foundry trade. The Federal Foundry Supply Co., Station D, Cleveland, O.

WANTED
Two good used medium sized drawer type core ovens. State condition, make and price. Address Box 989, THE FOUNDRY, Cleveland.

WANTED.
1—Sand Blast Barrel to clean small castings.
1—One or two-ton Traveling Crane.
Also I Beams and Track to cover storage yard 150 ft. long, 24 ft. 6 in. wide, about 12 ft. high.

MANSFIELD FOUNDRY CO
Mansfield, Mass.

Index to Advertisements

A

Adams Co. 39
Ajax Metal Co. 3
Alpha-Lux Company, Inc. 54
Aluminum Foundry Equipment Co. 56
American Boron Products Co., Inc. 84
American Bridge Co. 75
American Foundry Equipment Co. 6, 7
American Saw & Mfg. Co. 65
American Steel Abrasives Co. 38
American Vent Wax Co. 65
Arcade Manufacturing Co. 51
Austin Co., The ..... Back Cover

B

Bacharach Industrial Instrument Co. 82
Bartlett, C. O., & Snow Co. 41
Bascom & Co. 69
Bethlehem Steel Co. 53
Black & Decker Mfg. Co. 71
Bourne-Fuller Co. 78
Box Crane & Hoist Corp. 81
British Aluminium Co., Ltd. 82
Brosius, Edgar E., Inc. 80
Buckeye Portable Tool Co. 69
Bury Compressor Co. 80

C

Cape May Sand Co. 73
Carman, Edwin S., Inc. 84
Chisholm-Moore Hoist Corp. ..... Inside Front Cover
Cincinnati Electrical Tool Co. 71
Clark Tructractor Co. 61
Cleveland Crane & Engineering Co. 12, 13
Cleveland Electric Tramrail Division of Cleveland Crane & Engineering Co. 13
Cleveland Pneumatic Tool Co. 76
Clifton Machinery Co. 87
Conkey, H. D., & Co. 80
Corn Products Refining Co. 31

D

Dayton Oil Co. 65
Demmler, Wm., & Brothers 76
Detroit Electric Furnace Co. 18
Diamond Clamp & Flask Co. 37
Direct Separator Co., Inc. 78
Dixon, Joseph, Crucible Co. 67
Driver-Harris Co. 50

E

Electro Metallurgical Sales Corporation 46
Ervin Foundry & Mfg. Co. 79
Euclid Crane & Hoist Co. 58

F

Fisher, Alfred, Furnaces, Inc. 84
Foundry Equipment Co. 23
Foundry Manganese Co. 84
Franklin Core Rod & Gagger Co. 78

G

General Electric Co. 25
Globe Steel Abrasive Co. 76

H

Hammond Machinery Builders, Inc. 69
Hanna, M. A., Co. 83
Harnischfeger Corporation 63
Hauck Manufacturing Co. 80
Herman Pneumatic Machine Co. 49
Hillman Coal & Coke Co. 82
Hoevel Mfg. Corp. 78
Hunt, Robert W., Company 84
Hyatt Roller Bearing Co. 60

I

Illinois Clay Products Co. 65
Imperial Brass Mfg. Co. 80
Indiana Consumers Gas & By-Products Co. 83
Industrial Equipment Co. 80
Industrial Silica Corporation 19
International Molding Machine Co. 47

J

Jeffrey Manufacturing Co. 27
Johnston & Jennings Co. 78
Jones, W. A., Foundry & Machine Co. 44

K

Kellogg, Spencer, & Sons Sales Corp. 8, 9
Kling Bros. Engineering Works 42
Knefler-Bates Co. 22
Knickerbocker Co. 79
Koven, L. O., & Brother, Inc. 78

L

Linde Air Products Co. 29
Lindsay-McMillan Co. 33
Link-Belt Co. 90
Louden Machinery Co. 81
Lowe Manufacturing Co. 73

Mc

McCormick, J. S., Co. 24

M

Maehler, Paul, Co. 30
Magnetic Manufacturing Co. 34
Marschke Manufacturing Co. 71
Mathews Conveyer Co. 32
Mathieson Alkali Works, Inc. 48
Menefee Foundry Co., Inc. 69
Metal & Thermit Corporation 84
Michigan Screw Co. 75
Milwaukee Foundry Equipment Co. 76
Moline Iron Works 77

N

National Engineering Co. 45
New Haven Sand Blast Co. 14

O

Osborn Manufacturing Co., Inc. ..... Front Cover
Ottawa Silica Co. 21
Oxweld Acetylene Co. 29

P

Pangborn Corporation 35, 36
Paul & Beekman Mfg. Co. 71
Penn Foundry & Manufacturing Co. 80
Pennsylvania Lubricating Co. 65
Pennsylvania Pump & Compressor Co. 80
Pettinos, George F. 26
Phillips & McLaren Co. 79
Pilling & Co., Inc. 82
Pittsburgh Crushed Steel Co. 17
Pittsburgh Electric Furnace Corp. 84
Pressed Steel Co. 80
Prest-O-Lite Co., Inc. 29
Pulmosan Safety Equipment Corp. 77
Putnam, A. H., Co. 84

R

Ransohoff, N., Inc. 76
Reeder Manufacturing Co. 20
Rohrbacher Shoe Co. 77
Ross-Tacony Crucible Co. 80
Rotor Air Tool Co. 40
Royer Foundry & Machine Co. 43

S

Safety Grinding Wheel & Machine Co. 59
Scully-Jones & Co. 87
Semet-Solvay Co. 83
Shanafelt Manufacturing Co. 67
Shore Instrument & Mfg. Co., Inc. 80
Sly, W. W., Manufacturing Co. 16
Smith, Werner G., Co. 4, 5
Smith-Monroe Co. 79
Spencer Turbine Co. 52
Standard Chaplet & Supply Co. 69
Steelblast Abrasives Co. 15
Steel Shot & Grit Co. 17
Sterling Wheelbarrow Co. 81
Stevens, Frederic B., Inc. ..... Inside Back Cover
Swartwout Co. 28
Swindell, William, & Brothers 84

T

Tabor Manufacturing Co. 57
Titanium Alloy Manufacturing Co. 55
Truscon Steel Co. 67

U

Union Carbide & Carbon Corporation 29, 46
United Compound Co. 69
U. S. Aluminum Match Plate Co. 69
United States Graphite Co. 65
United States Refractories Corp. 80

V

Vickers, Charles 84

W

Western Tool & Manufacturing Co. 75
Whitehead Brothers Co. 73
Whiting Corporation 10, 11
Williams & Co. Inc. 82
Williams, G. H., Co. 80

Y

Young Brothers Co. 89

"Where-to-Buy," Page 62 | Classified Advertisers, Pages 85-87 | Table of Contents, Page 1033

Suggested Savings for 1930

In speaking of the battery of continuous conveyer core ovens recently installed in the foundry of an automobile manufacturing plant running on a production schedule of approximately 750 units per day (name on request), the Foundry Superintendent comments enthusiastically on the high degree of uniformity of the baked cores he is now getting.

He attributes to these new ovens much of the success his department has attained in improving the accuracy and over-all quality of castings, while at the same time operating costs were being reduced.

If your 1930 plans contemplate cost reductions or product betterment, Young Brothers Engineering Department can furnish you with interesting data and performance records.

YOUNG BROTHERS CO.
6508 Mack Avenue, Detroit, Michigan

DISTRICT SALES OFFICES:

30 Church St., New York
1323 Guarantee Title Bldg., Cleveland
432 Pennant Bldg., St. Louis
273 Seventh St., San Francisco
908 Ellicott Square, Buffalo
20 E. Jackson Blvd., Chicago
807 San Fernando Bldg., Los Angeles
948 Central Bldg., Seattle, Wash.
10 High St., Boston, Mass.
Hiram Walker & Sons Metal Products, Limited, Walkerville, Ont., Canada

YOUNG BROS. CO. OVENS
OUR BOLTLESS JOINT
DETROIT

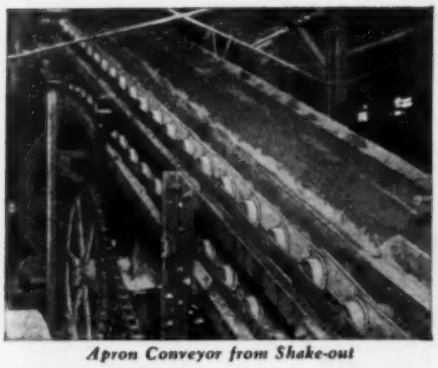
OVENS for

Core and mold baking
Low temperature heat treating
Drying
Japanning and Enameling
Electrical appliance baking
Adapted to all methods of heating

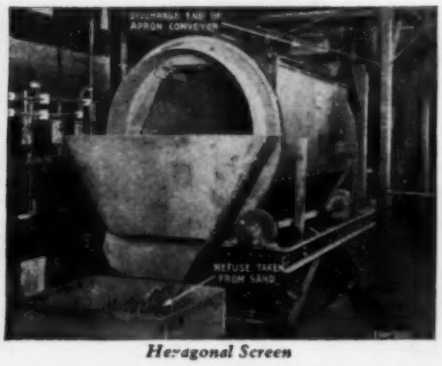
INDUSTRIAL OVENS

12

Better Castings, Cheaper, with LINK-BELT Sand Preparation and Conveying Equipment

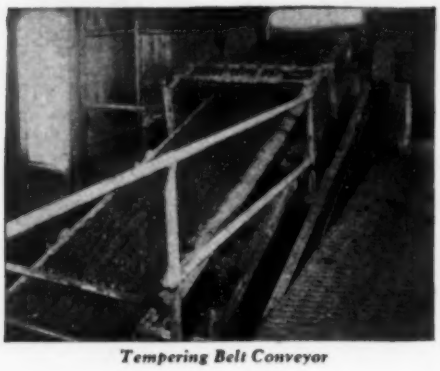


Apron Conveyor from Shake-out



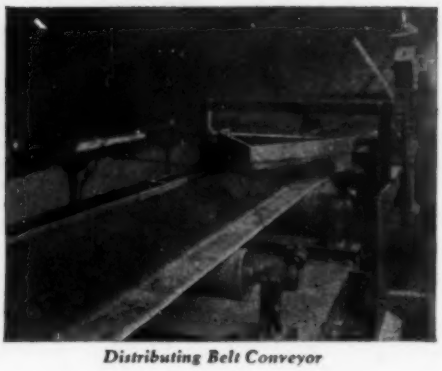
Hexagonal Screen

Mold Conveyor



Tempering Belt Conveyor

Link-Belt Revivifier



Distributing Belt Conveyor

Link-Belt Equipment for the Foundry

Sand Preparing Equipment
Sand Conveying Equipment
Mold Conveyors
Flask Conveyors
Belt Conveyors
Assembly Conveyors
Apron Conveyors
Flight Conveyors
Tempering Belts
Bucket Elevators
The Link-Belt Revivifier
Revolving Screens
Vibrating Screens
Sand Storage Bins
Locomotive Cranes
Portable Loaders
Chains, Wheels, Buckets
Rotary Disc Feeders
>Hex-Top< Grease Cups
Hexagonal Screens
Transmission Machinery

Send for Catalogs

AMONG the notable economies resulting from the use of Link-Belt sand preparation and conveying equipment, it has been found that the castings have a finer surface, and therefore do not require the amount of cleaning necessary when older methods are used.

Taken together, the economies effected by Link-Belt equipment, pay the cost of installation in an astonishingly short time.

The nearest Link-Belt engineer will be glad to discuss your problem with you, and perhaps suggest some means of lowering your costs. It is a service entailing no obligation . . . just ask him to call at your convenience.

LINK-BELT COMPANY

3850

Leading Manufacturers of Materials Handling and Power Transmission Machinery and Chains

CHICAGO 300 W. Pershing Road

PHILADELPHIA, 2045 W. Hunting Park Ave.

LINK-BELT

SAND AND MOLD HANDLING EQUIPMENT